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ORIGINAL LECTURES.

THE MORBID ANATOMY OF TYPHOID FEVER.

*The Annual Address,
delivered before the Philadelphia Pathological Society.*

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MR. PRESIDENT AND GENTLEMEN: Permit me in the first place to express to you my deep sense of the honor which has been conferred upon me by being selected to deliver the annual oration before you on this occasion.

The conception that I have formed of what such an address before a pathological society should be, is that it should embody the results of some original investigation, or if that be impossible, should suggest some line of thought in which it would seem that research might lead to something of value.

In casting about for a subject worthy of your attention, it occurred to me that a consideration of the lesions found after death from typhoid fever might be of interest. It is not that I have very much that is new to present to you upon this subject, for both in the general treatises and in the special works upon pathology will be found an immense fund of information in regard to the various morbid conditions of the tissues and organs in this complaint. Rather is it because in the course of my professional career I have been impressed with the fact that the view seems very common among physicians that typhoid fever is a disease of the intestines alone. Clinical experience as well as pathological investigations have led me to look upon this view as an erroneous one. As I have studied the symptoms presented by my patients—epistaxis, an early symptom, often present before the abdominal conditions are pronounced, the hebetude or delirium, the subsultus, the eruption and sudamina, and the marked pulmonary conditions—I have been unable to rest contented with the view that the disease is seen in its true light when looked upon as primarily a disease of the intestines. Sometimes it has struck me that the reason the disease is commonly so considered, is because it is generally known among the laity as well as among professional men that it so often arises from drinking impure water, which is taken first into the alimentary canal, and from there starts upon its course of mischief. It would be as reasonable, however, to argue that strychnine in poisonous doses produces death by its effects upon the alimentary system because it is taken by the mouth, as that typhoid fever is truly a disease of the same system; though in each the poison commonly enters by the same avenue.

The importance of conditions other than intestinal ones in typhoid fever first forced itself upon me, so far as my recollection serves, rather from considering the

disease clinically than from the grossness of the organic lesions. So much was this the case that two or three years ago I determined, as opportunities might arise, to make careful studies, both macroscopically and with the microscope, of as many of the organs and tissues as time and my ability enabled me to do.

It is the outcome of these investigations, as far as they have been made, that I want to present for your consideration. My results, of course, will be found to be far from perfect and there is room for further and almost unlimited study in the same line of thought, but so far as I shall make assertion of facts of observation I think you will find them to be true. When, however, I trespass into the fields of deduction you will, of course, do well to examine my logic and accept or deny my conclusions as the result may be.

With the object in view, then, of ascertaining whether other pathological changes besides the commonly-recognized ones in the intestines and mesenteric glands might be present, and be present perhaps with a greater or less degree of constancy, I have made careful search in some of my cases. The picture I wish to place before you cannot, I think, be better presented than by reporting somewhat in detail a case that was studied at considerable length.

There was admitted to the Pennsylvania Hospital, August 18, 1889, a man, twenty-seven years of age, who was born in America. He belonged to the laboring class, and said that he had never suffered from any previous illness except an acute attack of some kind when seven years old. He denied having indulged in excesses of any sort. Six days before admission to the hospital he ate watermelon and the next day was taken with abdominal pain; soon diarrhoea with a sense of heaviness and weakness of the legs came on. The day before coming to the hospital he had epistaxis, but he continued to work until his admission, though his appetite was poor and he had continual abdominal pain. He had also some cough and expectoration.

On admission his temperature was $103\frac{1}{2}^{\circ}$ and there was some tendency to retention of the urine. The tongue was moist and coated with a white fur, but not tremulous. There was no eruption upon the abdomen.

Physical examination gave the following results: The first sound of the heart was soft (anæmic); the lungs were everywhere filled with bronchial râles; the hepatic dulness was of the natural extent, and the splenic dulness was somewhat increased. The treatment was four grains of quinine twice daily and ten drops of dilute muriatic acid three times daily. He continued to have fever, the temperature varying generally between 101° and 104° , and after the first two days in the hospital he had diarrhoea, with from one to five stools in twenty-four hours. After a few days the tongue became dry and the pulse running, and there was much subsultus. The treatment was changed, turpentine and whiskey

being given; still later, as he continued to grow worse, spirit of chloroform and tincture of digitalis were used. No characteristic eruption appeared, but he continued to fail, the temperature rose to 106° and he became excessively nervous and died, August 27th.

At the autopsy the following conditions were found. There were many pleural adhesions, especially to the diaphragm. The lungs appeared to be much congested, being intensely dark-red and in some areas almost black, and blood freely exuded on section. The heart looked natural except that it was soft and its lining was stained very dark red. The liver was rather large and firm, but not very dark or much congested. The bile-duct was patulous. The spleen was three times the natural size, firm in texture and intensely dark red on section. The kidneys were slightly enlarged, flaccid and dark-colored on section. The small intestine throughout half its length presented many typical typhoid ulcerations of Peyer's patches, besides an unusually large number of smaller ulcers scattered generally over the inner surface. The mesenteric glands were enlarged to an unusual degree and on section some of them presented small spots of softening, the contents of which ran out, leaving cavities. The colon was congested but otherwise normal. The spinal cord presented congestion of the vessels upon its surface, especially of its lower half, where the veins were very full. The cord itself, both the surface and on section, looked natural.

Microscopical examination of sections cut from the lungs, heart, liver, spleen, kidney, ileum, mesenteric gland, and the spinal cord was made.

The most marked change presented by the lungs was that over large portions of the sections the appearance was simply that of a mass of blood. Large quantities of red corpuscles, exhibiting their characteristic outline and of a yellowish color, and unstained by carmine, with many leucocytes of varying size and appearance scattered amongst them, covered whole fields under the microscope. The blood filled the air-vesicles, bronchi, and bloodvessels, and in places there were evidences of inflammation, the tissue showing round-cell infiltration, and there being some catarrhal-exudate cells. The bronchioles and tissue for a short distance around them were inflamed, the cells of the epithelial lining having undergone proliferation, and the subepithelial tissue being infiltrated, thickened, and containing vessels filled with clotted blood. The blood-clot in one vessel of the lung-tissue was variously channelled out, new vessels being in process of formation in it, if they were not actually already formed. The heart-muscle was, in some places, in a very good state of preservation, the cross-striae being very sharp. In other parts the fibres were homogeneous or granular-looking. It seems likely that this was due to disease and not to faulty technique, for all the tissue was preserved, prepared, stained, and mounted under precisely similar conditions, if not at the same time, and yet the same section often showed the most marked contrasts. It seems that there was some endocarditis, for the endocardium appeared to be slightly thickened, and contained more than the natural number of nuclei.

That some myocardial inflammation, independent of the state of the muscle-fibres, was present, there can be

no doubt, for there was a great multiplication of the red-staining nuclei which are naturally present in the inter-muscular substance. In some areas there was a great deal of brown pigment in the muscle-fibres. Hæmorrhage into the substance of the muscle appeared to have taken place at one area.

In the liver the separation of the lobules from one another showed so plainly that it recalled the appearance of the liver of the pig. This must have been due to the presence of almost structureless fibrous tissue or exudative matter between the lobules. In many places the trabeculae could be seen, but the secreting cells had disappeared, as though by some cause the cells had been removed or destroyed, leaving the supporting framework *in situ*. In spots the tissue was broken down, looking as though the area would have been a minute abscess if life had continued longer.

The spleen was generally of a yellowish color when thin sections were examined, and the tissue did not stain well with carmine. The most marked feature was that instead of being composed of the usual small lymphoid cells, a large proportion was made up of cells of from three to five times the diameter of an ordinary lymph-cell. These in many instances were multinucleated and resembled more closely the large exudative cells so common in the lungs in inflammatory conditions than anything else.

The kidney-tissue was disorganized, as is usual in persons dying of acute diseases in which the blood is broken down, the cells being swollen and granular and often loosened from their positions. A striking feature of the picture presented was that the Malpighian tufts were nearly bare, having shed much of their epithelium.

The ileum showed the ordinary conditions of infiltration and ulceration of Peyer's glands. There was thickening, and some of the follicles had been shed, while others were in process of shedding. The thickened portion of the lymphoid tissue was, as in the spleen, largely composed of multinucleated cells several times larger than ordinary lymph-cells.

The mesenteric gland that was examined was more than an inch in its longest diameter. The cavities which were mentioned as visible to the naked eye had no specially-organized walls, there being at the periphery merely an area of active red-staining cells which shaded off into the rest of the tissue. At one area was a spot the cells of which had stained intensely red, gradually shading off to the color of the surrounding tissue; this must have been an early stage of the same condition which at a later period produced the cavities. These, it would seem, could be described only as abscesses. The condition of the cells composing the gland was parallel with that of those of the spleen and of the cells in the lymphoid portion of the ileum. Instead of being the ordinary small lymphoid cells, a great proportion of them were large multinucleated cells like those that were so abundant in the spleen.

The spinal cord presented appearances of which it is not easy to give an adequate description. That it was not healthy seems to be beyond doubt, and yet none of the changes were very gross. The postero-median (Goll's) columns in the cervical portion were in worse condition than any other portion of the tissue examined. With the naked eye it could be seen in the sections that

this portion of the cord had been stained a deeper red than the most of the tissue, and in it the nerve-fibres were not sharply outlined. The general impression was that there was too much neuroglia, which stained unduly red and seemed disposed to encroach upon the axis-cylinders. It appeared also as though the number of nuclei in the supporting tissue was increased. These appearances, of too much neuroglia, of being unusually red, and of the nerve-fibres not being as sharp in outline as natural, were present everywhere to a greater or less degree, but nowhere else to the same extent as in Goll's columns in the cervical portion. The central canal in the lumbar portion of the cord was quite widely open and the cells looked as though they had undergone proliferation. Sections were prepared from the cervical, dorsal, and lumbar regions, and were stained, both with carmine and carminate of sodium, according to the method of Schultze.

This case exemplifies how extensive and grave may be the lesions in what was clinically an ordinary case of typhoid fever, in which all the usual symptoms were present except the rash. It would have been very easy for me in making the post-mortem examination to have stopped and rested satisfied after discovering the ulcerations in the ileum with enlargement of the mesenteric glands, and the usual so-called congestion of the lungs. This error I have often committed, and have thereby, I doubt not, overlooked again and again lesions as important as those of which I have given an account.

For my own part, I cannot see that we have more reason to consider typhoid fever a disease of the intestines because there seems to be invariably present a lesion of the ileum than we have to describe scarlet fever as a skin disease because one of its invariable manifestations is an eruption of the skin. Both are general diseases, and are more properly to be considered in the present state of our understanding of such things, as due to derangement of function. Amongst my records I have the notes of two cases of undoubted typhoid fever: in both of them post-mortem examinations were made, and there was found no enlargement of the mesenteric glands, it being recorded that the largest gland was not more than a quarter of an inch in diameter.

My case as described directs attention to a number of lesions that I think are both common (if not invariably present) and very important in the disease. It would have been improper for me to come before you to relate an account of one case alone and then generalize therefrom if I had made no further investigations, and it is to be understood, therefore, that any deductions I may make are the result of study in a number of cases, though in no other one was the study so extensive as in the one detailed at length.

Disease, or at least disorder, of the lungs is known to be a common accompaniment of typhoid fever, but I do not think it is ordinarily, if ever, given the prominence that belongs to it. Murchison says that he noted bronchitis in twenty-one out of one hundred cases, and that it may be one of the earliest phenomena of the disease. He says further that in a large proportion of the cases which terminate fatally within the first fourteen days death is due to bronchitis and hypostatic engorgement of the lungs. More commonly both these conditions supervene in the fourth week, and then they may lead

to a fatal result. Of pneumonia, he says that he noted it in thirty out of one hundred cases.

In cases in which I have made microscopical study of the condition of the lungs—and this was typically represented in the case I have narrated in full—the appearances could hardly be classified as those either of pneumonia or bronchitis, as those terms are commonly accepted. The appearances were rather those of hæmorrhage, for as has been already stated, the air-vesicles, bronchi, and bloodvessels were filled with red corpuscles and leucocytes. In some of my specimens I have found air-vesicles filled with blood alternating with others containing fibrinous exudative material, and again catarrhal exudate cells. Commingled with these appearances were found those of inflammation of the lung-tissue—round-cell infiltration—and there were also bronchi which were much inflamed. The impression left upon the mind by all this, however, was that an early lesion was the escape of blood from the vessels. The fact that organization and the formation of bloodvessels had taken place in the clots within the very bloodvessels themselves is exceedingly interesting.

The soft heart of typhoid fever, originally described by Stokes,¹ is recognized by everyone as an almost essential feature of the disease, though its precise pathology is even yet not as thoroughly worked out as is desirable. The changes are most accurately and graphically described by Stokes, and so far as gross appearances are concerned, nothing has ever been added to our comprehension of the condition. Of course, so long ago no knowledge of the pathological histology was possible, for microscopical work was as yet of the crudest description. Stokes described what he saw as follows: "The heart is little, if at all, altered in volume. It is generally of a livid hue, but this it may have in common with other internal organs, as is often seen in fever. It feels extremely soft, especially in its left portion, and the left ventricle frequently pits on pressure. Nothing remarkable is to be found as to the pericardium or endocardium, and the valves are unaffected. The principal change is found in the muscular structure, which is often infiltrated with an adhesive, as it were, gummy secretion. The left ventricle exhibits a singular appearance, for the traces of the muscular fibres are lost, and the external layer to the depth of an eighth of an inch, converted into a homogeneous structure, in which no fibre can be found. The color of this altered portion is generally dark, and it resembles the cortical structure of the kidney. In some cases this change occurs in patches varying in depth, and from a quarter to three-quarters of an inch in breadth."

This description leaves nothing to be desired so far as the macroscopical appearances are concerned. The histological changes as I have seen them are disorganization of the muscle-fibres, which are either granular in structure and contain much brown pigment, or are homogeneous; great increase of the intermuscular nuclei, and sometimes hæmorrhage into the tissue. These

¹ It must be remembered that at the time Stokes made his observations the distinction between typhus and typhoid fevers was not yet made. This is evident from what he says in discussing the lesions in his book upon Diseases of the Heart and Aorta: "As to the intestines, we sometimes found ulcerations of the ileum, while in other cases no such lesion existed."

changes vary to almost any extent in different cases, healthy tissue alternating through the organ with diseased areas. The alterations of structure are probably not inherently irreparable, nature being capable under favorable circumstances of replacing the diseased by sound tissue. The result, therefore, the life or death of the patient, must depend, so far as the heart is concerned, upon the extent and situation of the change, complete recovery taking place in cases in which the disease has not progressed too far. The great increase of nuclei in the intermuscular tissue is a strange phenomenon, and in the present state of knowledge, somewhat inexplicable. It must be due to cell-multiplication either in the connective tissue or of the vascular tissue, the capillaries of the heart being always very rich in nuclei. Hæmorrhage into the tissue of the heart must have a most disastrous effect upon its functional activity.

The condition of the liver in some of the cases that I have seen was peculiar. The lobules were much more distinctly outlined than in the healthy state, and some evidences of degeneration and inflammatory action were present. In the *Transactions of the Pathological Society of London*, 1889, there is an article by H. Handford on "Hepatitis in Enteric Fever," in which he says: "But the most characteristic change, though so far as I have observed, not quite a constant one, is the presence of small rounded areas that stain imperfectly, that are infiltrated more or less thickly with leucocytes, and that are surrounded by a dense ring of cellular infiltration. . . . In other similar patches, which I take to be in a more advanced stage, the liver cells cannot be distinguished at all. . . . In yet a third variety there exist simply rounded aggregations of leucocytes, the smaller patches hardly distinguishable from commencing miliary tubercles, and the larger ones from the early stages of miliary abscesses." Accompanying the paper is a plate graphically representing the appearances, and both it and the description as quoted tally closely with what I myself have observed.

The spleen, everyone knows, is almost always enlarged in typhoid fever. The only thing that has struck me as at all peculiar in making microscopical examinations of that organ in typhoid fever is the appearance of the cells which I have mentioned in the description of a case, very large multinucleated cells constituting a large part of the organ. Cells of like appearance, as has already been mentioned, are very abundant in the mesenteric glands and in the glandular tissues of the ileum.

The kidney does not seem to take on any special characteristics, presenting merely the appearances commonly termed cloudy swelling, and in the few cases in which I have made examinations, the capillary loops of the glomeruli being to a considerable extent bared of epithelium.

The cavities, seemingly abscesses, in the mesenteric glands show how great was the destruction in these tissues.

Microscopical study of the condition of the spinal cord in typhoid fever does not seem heretofore to have been pursued to a great extent. Of late years, too, improvements in microscopical technique render possible a much more accurate and satisfactory examination of delicate tissues like the cord than was previously possible. That there was considerable disorganization of the

tissue in the case described is beyond doubt, and it presented itself in its highest degree in the postero-median columns in the cervical portion of the cord.

It is interesting to contemplate and to reflect upon one phenomenon presented in the disease, namely, the tendency of the blood to escape from the vessels in so many parts of the body. Hæmorrhage into a tissue, though not necessarily destructive, is always to a greater or less degree injurious, and in typhoid fever it is common from the nose and from the ulcers in the intestines, into the lungs, and sometimes into the substance of the heart. The condition, too, of the spleen and mesenteric glands would seem to present something analogous to hæmorrhage, for they are much enlarged and engorged with blood, but the nature of lymph-gland tissue is such that with present methods of microscopical examination it is not possible to be absolutely certain whether there is any escape of blood from the vessels or whether it is still retained within their walls. The abundant presence of red blood-corpuscles in such tissues is of course perfectly patent to anyone who has ever examined them with the microscope.

The amount of red blood-corpuscles that commonly lie in the pulmonary alveoli after death from typhoid fever, and the way that they alternate with areas presenting the appearances of pneumonic inflammation and exudation, how the hæmorrhage occurred and what changes it may undergo, have seemed to me questions of the greatest interest. This question of hæmorrhage into the lung in typhoid fever, if not actually new, is, I think, capable of being presented in a somewhat new aspect. Every clinician knows how common a symptom in typhoid fever bloody expectoration is. The importance of the condition of the lungs and the frequency with which they are involved is the turning-point upon which will rest the question of death or recovery—a matter which can hardly be given too great prominence. It is from the consideration of these turning-points in acute diseases I think that most can be done for the science of therapeutics.

The common practice in typhoid fever is to direct our therapeutic measures toward what is called the antiseptic method, toward the old expectant plan, or almost alone toward feeding, and again another physician will place his chief reliance upon the supporting effect of stimulants. This may be well enough in most cases, but I am quite convinced that, often, careful observation of the lungs and watchfulness to foresee the advent of more serious lung involvement, and well-directed efforts made to bring about a cure through therapeutic measures applied to the lungs, will conduce very greatly toward reducing the mortality record from the disease. By constantly keeping in mind the fact that the lung condition is of the greatest importance, and by wisely changing our course of management and medication when we see that these organs are about to become involved, or that their condition is likely to become worse, even to the extent of neglecting or setting aside all other treatment and directing our attention to the lungs alone, cases may be saved which would otherwise be lost. This, at least, is my impression, after a good deal of experience with the disease.

My object to-night has been not to make a pretence that I had a finished treatise upon the morbid anatomy

of typhoid fever to lay before you, but rather to call your attention to such points of interest as, in my experience in the therapeutic management and pathological study of the disease, have come directly to my knowledge. For the disease is one which is so common that all physicians, whether they practise medicine or study pathology alone, are constantly called upon to deal with and to consider in its various aspects.

For my own part, I look upon it as a general condition, to be classed rather with diseases like smallpox or scarlet fever, which seem from their earliest stages to take hold of a large part of the system, though they have an invariable local manifestation, than with pneumonia, which begins locally in the lungs, and then by secondary involvement may invade other parts of the system to almost any extent. I am entirely unable, however the poison may have originally found entrance to the system, to see the reason for considering it to be truly a disease of the intestines. In many cases that I have attended there have never been, from beginning to end, any abdominal symptoms, no diarrhoea, no abdominal pain, no gurgling, no tympany—I have notes of cases in which, even from the beginning of the attack to the end in death, there was no loss of appetite. On the other hand, we all have frequently seen cases in which life was threatened or death occurred as a consequence of involvement of some other part of the system—the abdominal symptoms being, if not absent, at least so latent as to allow us to be quite sure that the threatened danger did not come from that quarter.

To show that I am not alone in such views as I have enunciated I will quote from an essay which seems to me a most admirable and suggestive one. In the Lumleian Lectures on Enteric Fever, by John Harley (*Lancet*, April 13, 1889), after discussing various *pros* and *cons* concerning the etiology of the disease, Harley makes the following statement: "From the foregoing considerations, I think it unreasonable to assent to the germ-theory of disease, and I can only regard it as another of the many instances in medicine and out of it where cause and effect have not been discriminated. Setting aside, therefore, this theory, I shall endeavor to prove that the disease under consideration is merely the effect of derangement of function." There is much more that is of interest in the essay, especially that it becomes evident as he unfolds his views that he tends to believe that typhoid fever may arise *de novo*. The germ-theory is of course the outcome and ultimate conclusion of the belief that the disease is local in the intestine.

There is another matter which I think is seldom given due weight in determining our prognosis in typhoid fever—the degree of our bodily perfection at the time we are attacked by any acute disease must largely influence our chances of recovery, and the degree to which our bodies are imperfect must render us more liable to disease. Does it not often happen that those who die of acute diseases had already in them some imperfection which took away the power to resist the depressing action of the acute process? Each attack from which we suffer and during which inflammatory processes take hold of any part of our tissues must leave us with a permanent mark—an imperfection—of greater or less degree. This thought is a very suggestive one and one which might perhaps be pursued with advantage to much greater

length. In all cases of typhoid fever, therefore, we should, when dealing with them from the clinical standpoint, carefully try to ascertain if there was any preëxisting bodily imperfection which would make the prognosis more serious, and at our post-mortem examinations should seek equally carefully for the presence of lesions which were already present in the body before the attack came on.

Finally, let me recapitulate some of the points that it has been my desire to dwell upon and to elucidate.

1. The disease is in my estimation a general one, involving a large part of the system, and in no way a local disease of the intestine. This belief is supported by the many and extensive organic lesions found in the body after death; and thus it would seem likely that Harley is right in his statement that the disease is due in the first place to derangements of function, and in rejecting the germ-theory of its origin.

2. The frequency of hæmorrhages in various parts of the body and their importance, I have dwelt upon and I wish to repeat my belief that hæmorrhage into the substance of the lung is most common. This latter, if not a new observation, is a fact certainly not commonly known.

3. The observation that the spleen, mesenteric glands, and lymphoid tissue of the ileum are made up to a great extent of large multinucleated cells instead of the ordinary small lymphoid elements is a curious and interesting one and requires further study; such study may possibly lead in the future to something which may have practical value.

4. Careful microscopical study of the condition of the spinal cord in the disease is much to be desired.

5. The attempt is made to show the need of a careful consideration of the previous condition of bodily perfection of persons attacked by the disease as having an important bearing upon prognosis.

6. We should be influenced in our treatment of typhoid fever to a great degree by the manner in which it takes violent hold of this or that portion of the organism. Our therapeutic efforts will be much more likely to be crowned with success by a careful consideration of this matter.

In conclusion, I repeat that my wish has been to make my essay suggestive rather than final, to point to threads which if followed to their endings may lead to an advancement of our knowledge of the pathological anatomy of typhoid fever, for such an advance will surely lead us in the future to a better treatment, if not to that which would be best of all, the prevention of the disease.

ORIGINAL ARTICLES.

THE TREATMENT OF ORGANIC STRICTURE OF THE MALE URETHRA.¹

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I HAVE endeavored in this paper to portray the subject of the treatment of stricture in a light

¹ Read before the Mississippi Valley Medical Association, October 10, 1890.

interesting to the general practitioner as well as to the specialist in genito-urinary diseases. I have not treated my theme as exhaustively as I should have done had I prepared the article for an association of genito-urinary surgeons, and I have contented myself with the discussion of the most recent and most approved methods of treatment in organic stricture of the male urethra.

Dilatation, interrupted or gradual.—In view of the elastic and distensible character of the urethra, it has been the time-honored custom to begin the treatment of stricture by the passage of suitable instruments. The urethra is injected with carbolyzed olive oil, and the largest bougie that can be passed through the meatus is slowly and gently guided as far as the neck of the bladder. If the meatus is not sufficiently large to admit an instrument corresponding to the normal calibre of the urethra, a preliminary meatotomy immediately suggests itself. This process of dilatation is repeated daily, or every second or third day, as the indications demand, until the canal resumes its normal dimensions, or the more urgent symptoms of contraction disappear. It is unnecessary to state that when the stricture or strictures are located in the penile urethra only, the curved sound is not the proper instrument to employ. Either the ordinary straight steel sound or Weiss's *bougie à boule* will produce the necessary dilatation in this portion of the canal, and the introduction of an instrument into the bladder is not only in most instances unnecessary but absolutely injurious.

In the practice of urethral surgery the operator cannot be too strongly impressed with the fact of the exquisite tenderness and sensitiveness of the urethra, and the slightest amount of force in the introduction of an instrument should be regarded as a relic of barbaric surgery. When commencing the treatment by gradual dilatation, in sensitive patients, I always produce local anæsthesia by injecting from twenty to thirty minims of a four-per-cent. solution of hydrochlorate of cocaine. In the case of a stricture admitting a medium-sized sound, instead of injecting the carbolyzed oil it will be only necessary to lubricate the instrument, but in all instances in which we are dealing with a narrow or tortuous contraction, the passage of the sound will be greatly facilitated by the preliminary injection of oil.

Another point, which I think is not always fully appreciated, is, that we should never attempt to pass an instrument which will over-distend the stricture. I have seen the urethra rendered extremely sensitive and the process of dilatation delayed, sometimes for several days, by neglecting this simple precaution. As Brodie says, "The temper of the urethra varies as much as the temper of the mind," and the ulti-

mate success of any method of dilatation must largely depend upon a thorough appreciation of this fact.

Instead of the steel sound it is the custom of Reginald Harrison, one of the best writers on the surgical diseases of the genito-urinary organs, to employ the flexible *bougie à boule*, and in inexperienced hands I think that this is the best instrument, inasmuch as with it there is little danger of injuring the urethra, and scarcely the possibility of producing a false passage. The cases of stricture amenable to this method of gradual or interrupted dilatation are those of recent date, those in which the urethra will tolerate the occasional instrumental interference, and those in which the patency of the canal remains intact after the employment of suitable dilators.

Continuous dilatation.—Continuous dilatation deserves but a passing comment. Since the introduction of Bank's whalebone filiform bougies the necessity for continuous dilatation has become more and more infrequent. By using successive sizes of this valuable instrument the narrowest stricture can at one *séance* be so thoroughly dilated as to admit a small-sized bougie, or the ordinary urethrotome. Of course, tight and narrow strictures, through which it is impossible to pass even a filiform bougie, will occasionally be encountered, but these instances must be exceedingly rare. Surely no genito-urinary specialist can afford to exclude from his armamentarium instruments so important and useful as Bank's filiform bougies, as they will render him good service in every case of annoying and troublesome stricture.

Internal urethrotomy.—Since the fear of rigors and urine fever has almost entirely vanished from the mind of the genito-urinary surgeon the internal section of the constricting tissues has deservedly become the most popular operative procedure for the relief and cure of organic stricture. The antiseptic precautions, and the subsequent attention to urethral sepsis, first practised, I believe, by Reginald Harrison, have rendered internal urethrotomy one of the safest of operations. In no case in which the specific directions of Mr. Harrison were strictly adhered to have I noted a single chill, and the fever, when any occurred, was only such as might supervene upon the performance of any minor surgical operation. It has been experimentally demonstrated by Bouchard, and practically proven by Harrison, that the cause of urine fever is the absorption of the toxic elements of the urine by the freshly-made incision. If, then, by any means, we can succeed in maintaining the wound aseptic, the patient will suffer from neither rigors nor fever; the cut surface will heal with a cicatrix that is less contractile than the previous cicatrix, and the

probabilities of permanent recovery will be greatly increased.

In discussing what I deem the most important and almost universally applicable operation for the radical cure of stricture, I will be pardoned for entering into the special details of the operation. The urethrotome that I now employ is Wyeth's modification of Otis's instrument, the only advantage of the Wyeth instrument being the cog-wheel attachment, which permits the incision to be made with greater accuracy. Dr. Gerster has recently brought before the profession a urethrotome for which he claims superiority because of the facility with which it can be separated into its component parts, and thus kept perfectly aseptic, but the Otis urethrotome can, I think, be rendered just as aseptic by boiling.

The urine in every case of stricture should be critically examined, and if the patient be suffering from suppurative disease of the kidney no operation should be advised.

As a rule, it is best to administer a general anæsthetic, unless it is against the especial request of the patient. It is a common custom with some surgeons to cocaineize the part, and then to operate; but one cannot have the same freedom of manipulation, and the patient's struggles will often interfere with the thorough application of the method.

For irrigating the urethra previous to the operation I use warm Thiersch's solution. Having injected a small syringe of four-per-cent. carbolic olive oil, I introduce the closed urethrotome beyond the deepest stricture. The instrument is then expanded until the resistance to the rotation of the screw is perceptible, and the knife is made to traverse the stricture from behind forward, and is slowly returned to its original position. The instrument is now still further expanded, and if any resistance still persists the cutting is repeated. I continue the dilatation to a calibre of 40, French scale, but rarely protrude the knife beyond the register of 30 or 32. A curved steel sound is next passed through the incision, the size of the sound corresponding to the normal calibre of the urethra operated upon. The sound usually employed for this purpose varies between 30 and 36 of the French scale.

After satisfying myself that all constricting bands have been divided, I introduce into the bladder a silk catheter or Tiemann's velvet-eyed soft-rubber catheter, draw off all the urine, and irrigate the bladder with warm Thiersch's solution. I then slowly withdraw the catheter until the solution escapes by its side from the meatus, so that the recent incision shall be rendered completely aseptic. The catheter is finally reintroduced just within the neck of the bladder, and secured in this position. The

urine is thus gradually drained from the bladder, and is received into a covered receptacle in the bed, or conducted by a rubber tube to a vessel beneath. The catheter is usually permitted to remain in place for forty-eight hours, the bladder and wound being irrigated twice daily. After the catheter is removed the patient is directed to inject one or two syringefuls of Thiersch's solution after each micturition.

When these precautions and directions were strictly adhered to I have never known a rigor or an elevation of temperature to ensue. I have observed a rise of a degree or a degree and a half above the normal temperature during the first twelve hours after the operation, but this I consider has no relation to urine fever.

If, as is claimed by Dreyfous, Sahli, and others, the urine can be rendered aseptic by the internal exhibition of salol—the salicylate of phenol—there will be no necessity for the retention of the catheter. But in all cases in which the stricture is complicated by cystitis it is well to have the catheter retained, so that the bladder may be kept entirely free from urine. In three cases in which I operated in this manner I can record most satisfactory results. Salol, I think, is worthy of a trial.

Internal urethrotomy performed in this manner is, I believe, a perfectly safe operation. As a routine practice I give immediately after the operation five or ten grains of the sulphate of quinine, and a hypodermic injection of a fourth or a third of a grain of sulphate of morphine. The opiate allays the pain and nervous irritability, but it is a question whether the quinine is really of benefit, unless, perhaps, the patient has recently suffered from malaria.

In most cases, in the evening of the third or fourth day, the patient should be directed to micturate, after which a medium-sized sound is passed through the incision, and followed by an instrument large enough to distend the urethra gently. The patient should retain his urine as long as possible, and should be instructed to inject one or two syringefuls of an antiseptic solution immediately after micturition. When the incision is thus kept aseptic and clean the wound heals kindly, and there is much less danger of subsequent contraction.

When there is more than one stricture, as is usually the case, the deepest is divided first and the others in succession from behind forward.

In regard to the location of the incision, whether upon the floor or the roof of the urethra, I am in the habit of cutting, when necessary, in both positions. In strictures of long standing, and in those in which the constricting band can be distinctly felt, I think it best to make the division first on the roof, and then, reversing the urethrotome, repeat the procedure on the floor of the urethra. The absorption and final disappearance of the organized tissues of the stricture

are thus more likely to occur than when only the incision on the roof is employed.

The subsequent passage of sounds through the divided stricture is essential to the success of internal urethrotomy. As a rule, the sound should be passed every third day for a period of two or three weeks, and afterward once a week for two or three months. To obviate still further the probability of a recurrence of the contraction, it is best to pass the sound once every three months for one year.

I believe that if internal urethrotomy is properly and thoroughly executed, and if special care is exercised to maintain the patency of the canal until the wound is entirely healed, recontraction is of rare occurrence.

Authorities are divided in regard to performing internal urethrotomy in the bulbous or in the membranous urethra. Judging from the results obtained by Harrison, the combination of external and internal urethrotomy offers encouragement for the permanent cure of stricture. I have had only three opportunities to perform external urethrotomy without a guide, but the results as regards the non-recurrence of contraction were entirely satisfactory.

External urethrotomy with a guide is a simple operation, can be performed with facility and rapidity, and promises more satisfactory ultimate results than internal urethrotomy performed in the deep urethra.

To enter into the details of the combined operations, as well as to discuss the various operations for the so-called impermeable strictures, would increase the size of my paper far beyond its proper limits.

In conclusion, I wish to say that of the various scales that have been proposed for urethral instruments, only the French system is worthy of consideration. To have a urethrotome graduated in millimetres—and all of them with which I am acquainted are so graduated—and sounds corresponding to the English scale, is a manifest absurdity.

ACUTE DYSENTERY AND THE AMCEBA COLI.¹

By ALFRED STENGEL, M.D.,
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THE following cases of acute dysentery illustrate some points in the symptomatology and treatment of this disease, and furnished the material for some investigations into its etiology:

CASE I.—Mary D., seventy-three years old, has been an inmate of the hospital for many years, during which she has had various illnesses. She is known to have had albuminuria, with granular casts. On September 19, 1890, patient was seized with

dysenteric diarrhoea, severe and typical from the first. The stools were rather large and very frequent, and contained mucus and blood, but were unaccompanied by severe distress. There was fever, with great depression. The patient was given arsenite of copper, at the outset in doses of $\frac{1}{100}$ of a grain three times during the night, and in smaller doses every twenty minutes during the day. Ice suppositories, about the size of the thumb, were also used every three hours, but no relief was obtained. The stools became larger and more hæmorrhagic, the general depression increased, and the condition seemed more and more that of uræmia. Later, bismuth and astringents were tried, but without avail, and the patient died on September 22d, three days after the onset of the disease.

Autopsy showed a distinct ulcerative colitis and proctitis. No membrane was present, but small ulcers and much extravasated blood were found in the mucous membrane.

CASE II.—Patrick T., aged forty years, a laborer, admitted August 25, 1890. Patient was stout and healthy in appearance, but has used alcohol to excess, and has lived a life of hardship. He said that he had had diarrhoea for several weeks, and that he had been drinking heavily at the same time. When admitted he complained of great pain in the lower part of the abdomen, some pain in the legs and arms, great thirst and gastric irritability. The stools were very frequent, attended with much tenesmus, and consisted of stringy mucus, streaked with blood. The temperature was slightly elevated; the pulse was rapid and weak. He was given bismuth subnitrate with paregoric and syrup of ipecacuanha every two hours. No relief was obtained from this treatment, which was continued two days. Later, acetate of lead and opium were given, with an occasional opium suppository. The latter proving irritating, and being discharged immediately after insertion, suppositories of ice were used instead, with great relief.

Under this treatment the tenesmus entirely disappeared, the stools became larger and free from blood and mucus, and the man's general condition improved. The temperature, however, made long daily excursions, reaching 102° or at night higher, and falling below the normal in the morning. As the diarrhoea still continued to be excessive and accompanied by considerable abdominal pain and tenderness, an astringent diarrhoea mixture was given, with no better result. The pains or cramps were sometimes unusually severe; at such times the pulse became extremely rapid and small, the features pinched and blue, and the extremities first cold, then bathed in a profuse perspiration. Salicylate of bismuth in doses of 10 grains every two hours was next used, and under this treatment the patient slightly improved. There still remained excessive diarrhoea, with great weakness, and occasional pains which were sometimes severe, more often slight, and in spite of salicylate of bismuth, and, later, thymol, the case still remains in about the same condition. The temperature has made longer excursions, falling lower and rising higher than at first. The tongue is dry and coated, the pulse is

¹ The cases reported in this paper occurred in the service of Dr. F. P. Henry at the Philadelphia Hospital.

weak and rapid, and the man is very weak, though not markedly emaciated.

CASE III.—Joseph Q., aged thirty years, a cigar-maker, was admitted to the wards on September 30, 1890, while intoxicated. Patient is an alcoholic, and has had malarial fever several times. He gave a history of having had diarrhoea for four or five days. The stools were very frequent, and accompanied by much tenesmus, soon becoming small. They contained mucus and blood, and were discharged involuntarily. On admission his temperature was $101\frac{3}{4}^{\circ}$, pulse 110, and respirations 18. The face was flushed, and there was considerable pain in all parts of the body. No disease of the lungs. The heart was acting very rapidly, and with a distinct galloping rhythm, especially marked at the apex. The urine was high-colored, and contained a trace of albumin, but no casts. The evacuations were very frequent and painful, and, as stated above, typically dysenteric.

Treatment with ipecacuanha and morphine was first adopted. Of the former, an initial dose of 30 grains, followed by 10 grains every two hours; of the latter, small doses preceding the ipecacuanha were given. This treatment was continued for one day without inducing vomiting, excepting after the first dose, but without influencing the course of the disease. Ice suppositories were employed at the same time, but no good effects were derived from them. At the end of the day, treatment was changed to magnesium sulphate 40 grains, deodorized tincture of opium 5 minims, with syrup of lemon and water, every hour until four doses had been given, when the stools became large, dark, and free from mucus and blood. The mixture was then given every two hours during one day, when the changed character of the stool was fully established, and the pains were entirely relieved. Bismuth subnitrate and powdered opium were then used. A slight reappearance of the mucus required a temporary return to the magnesium sulphate mixture, but convalescence was fully established on the fifth day.

The fever in this case was moderate, but continuous, and the general condition was not much impaired, although there was some abdominal tenderness, especially on the left side.

CASE IV.—Emily F., aged seventy-two years, has been in the hospital for several months, suffering from chronic nodular rheumatism. She slept in a bed near that of Case I., and after the death of the latter her bed occupied the place made vacant. On September 28th, the patient began to suffer with diarrhoea, which soon became dysenteric. The stools were frequent, small, mucous, and bloody. There were much straining, abdominal pain, general depression, loss of appetite, and excessive thirst, but no elevation of temperature.

Salol in doses of 10 grains, combined with opium and ipecacuanha, was first tried, but gave no relief. Then the magnesium sulphate mixture was used, and after three or four doses the stools became large, brown, and painless, then less liquid, and less frequent, when bismuth and opium were substituted for the magnesium sulphate. For the great tenesmus which was a prominent feature in this case, ice

suppositories were used with surprisingly good result. A temporary return of mucus in the stools required a return to the magnesium sulphate, but permanent relief was soon obtained, and the case convalesced. There was some abdominal tenderness in the left iliac region during the progress of the case.

CASE V.—Robert D., aged forty-eight years, is a stretcher-carrier in the receiving ward of the hospital, and is frequently called up at night. On the night of September 30, 1890, he was up several times, and became overheated. He had several loose, semi-liquid stools before morning, and on the next day began to have very frequent discharges, all of which were mucous and bloody, and were attended with much straining, and general as well as abdominal pain. There were slight fever, excessive sweating, loss of appetite, and great thirst.

On the morning of October 2d, the patient began to take arsenite of copper in doses of $\frac{1}{100}$ of a grain every two hours, but did not improve. Then the magnesium sulphate was used, and after a few doses the stools became painless and free, the general depression less marked, and mucus and blood disappeared from the discharges. The mixture was continued for a day longer, when bismuth and opium were substituted, and the case progressed favorably. In this case also there was a temporary reappearance of mucus in the stools, and some pain, but a few doses of the magnesium sulphate sufficed to relieve this. There was slight but continuous pain in the abdomen, especially in the left iliac region.

A summary of the important features presented by these cases may not be out of place.

The tendency of dysentery, especially in its less grave varieties, to begin with ordinary diarrhoea, is well illustrated in four of our cases, while the fifth case confirms the old observation that when overwhelmingly severe the disease is likely to be dysenteric from the start.

The character of the pain was similar to that which has often been observed, but the abdominal tenderness so prominent in four of our cases is not referred to in the text-books. This tenderness was slight in three of the cases, and excessive in one, was nearly constant, and was most marked in the left iliac region.

As to the propagation of the disease, it is interesting to note that in one patient in the same ward and adjacent to Case I., and in two other similar instances, mucous and slightly blood-tinged stools were observed (Cases III. and IV.).

Conclusions as to the effect of various plans of treatment can hardly be drawn from so few cases, but the observations may be of value in connection with those of others using similar methods.

In two cases ipecacuanha was employed—small doses in one, large in the other—but no change in the character of the stools or the course of the disease was observed.

Arsenite of copper, lately so much lauded in the

treatment of dysentery and diarrhoea, was used in three of the cases, first in minute then in larger doses, but no good whatever resulted, though at least one of the cases was favorable.

Salol was used in one case in doses of 10 grains, but was without effect. The mixture of magnesium sulphate with deodorized tincture of opium, syrup of lemon, and water, was given in three cases, after other measures had failed, and in each, after a very few doses, the character of the stools changed, the pain lessened, and no doubt the course of the disease was cut short. There was a tendency to relapse in each case, but a few doses of this mixture checked it, and convalescence was otherwise uninterrupted. Whatever the results that have been obtained by other remedies, certain it is that in these cases the magnesium sulphate served to alleviate suffering most promptly, and to check the progress of the disease.

In three of these cases suppositories of ice were used, in one after opium suppositories and enema had been rejected. In two the results were most gratifying, the pain disappearing almost instantly. In the third, however, no effect was observed. It is difficult to say whether the number of stools was lessened by the ice, but when used at once on the occurrence of pain the interval between the stools seemed to be materially increased.

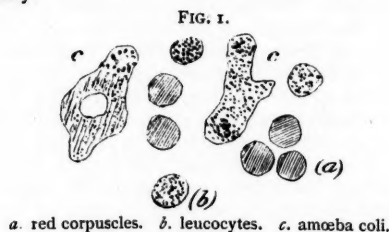
Renewed attention in this country has been called to the examination of dysenteric stools by a recent paper by Osler,¹ confirming the observations of Losch, Lambl, and Kartulis, who have found the amoeba coli in the discharges of cases of ulcerative colitis, chronic diarrhoea, and dysentery, as well as in the abscesses succeeding such cases. Osler reports a case of chronic dysentery with abscess of the liver, in which examination of the stools and pus of the abscess revealed large numbers of the amoebæ. Our investigations have been confined to three cases (Cases III., IV., and V.), and in each the amoeba was found in more or less abundance.

Macroscopically, the discharges of Cases III. and IV. were much alike—small, rather stringy, mucous, and blood-tinged. The appearance of the stools of Case V. was slightly different, being more lumpy, containing larger masses of blood, and more suggestive of a diphtheritic condition of the bowel.

Microscopically, there was but little difference. The stools of Case III. were examined on October 1st, the day after the patient's admission to the hospital. Large numbers of red corpuscles and pus corpuscles were found, besides many bacteria of different kinds, micrococci and bacilli, in active motion, predominating. Easily distinguishable from the other elements and very numerous, were the large

amoebaform bodies first described by Losch. They were conspicuous by their size, which ranged from 10 to 30 micromillimetres; by a more brilliant appearance of the protoplasm than was seen in the other bodies, by the constant active amoeboid motions; and by the presence within them of both large and small vacuoles, or hyaline bodies. All portions of the mucous stools contained them, but they seemed most numerous in the small blood-stained masses. The protoplasm was granular and distinctly outlined, and contained large numbers of pigment granules in active motion. When at rest the bodies were round or ovoid, but long, finger-like prolongations were frequently extended, and the pigment granules were mainly aggregated at the extremities of these. Some of the amoebæ had distinct nuclei, and a few hyaline bodies or vacuoles.

Figure 1 represents the appearance seen on the first day.



Subsequent examinations were made daily, or whenever mucus appeared in the discharges, with substantially the same results. On October 2d the number of amoebæ had already decreased, and the movements were much less active. Vacuoles now were more commonly observed, and were sometimes quite large, and a few were partially surrounded by pigment granules, as described by Osler. The number of vacuoles in each amoeba varied from one to several. The movement of the protoplasm was slower and less evident, as was also that of the pigment matter.

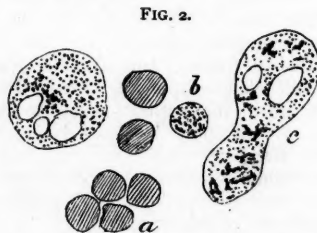


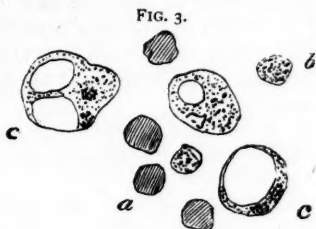
Figure 2 represents the appearances seen in the discharges of Case III., on October 3d, two days after the onset of the disease, and confirmed those previously made.

The organisms in Case IV. were smaller, the vacuoles more prominent, and the movement of the

¹ Johns Hopkins Hospital Bulletin, May, 1890.

pigment grains less active. The stool was somewhat old, and was cold when examined. Subsequent examination showed less, but still quite numerous, amœbæ.

Figure 3 represents the appearances of the stools in Case IV. In this case the first examination, made four or five days after the onset of the disease, showed but few of the organisms, which, however, presented the same picture as those seen in Cases III. and V.



The attempt to stain the amœbæ with methyl-blue and fuchsin failed, but Kartulis says they can be beautifully colored with eosin.

On October 7th mucus taken from one of the large brown stools of Case IV. was injected into the rectum of a guinea-pig, but after eight days no result has been obtained.

**AN INQUIRY INTO THE CAUSE OF ALARMING
AND FATAL RESULTS FOLLOWING
ATTEMPTS AT THE RADICAL
CURE OF HYDROCELE.**

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I WISH to state at the outset that this paper is confined to the subject-matter embraced in the title, and that it has nothing to do with the anatomy, etiology, pathology, or diagnosis of hydrocele. Its purpose is to take up the three widely-accepted methods of dealing with hydrocele, viz., treatment by injections, by the seton, and by the open method; to give examples of casualties of a most serious nature that have attended each; and to present the reasons that have suggested themselves to the author for the too frequent occurrence of such accidents.

And first, let me state why I selected the subject. In the spring of 1882 an aged colored man was sent to the Presbyterian Hospital, suffering from retention of urine. His penis was withdrawn into the scrotal tissues, as is not infrequently seen when large hydroceles are present, but not, as sometimes happens, offering an obstacle to catheterization.

I was about to tap and inject the sac when my colleague, Dr. Porter, said to me, "I would be careful what I did to that man, as I lost a similar

case not long ago." Scarcely realizing his statement, yet in deference to his suggestion, I simply tapped the hydrocele, and waiting for reaccumulation, tapped a second time in a fortnight, and injected alcohol. A few weeks later the patient left the hospital with a scrotal tumor, as we all supposed, undergoing the changes so commonly seen in the course of radical cure. A few weeks later I was sent for to see the man at his home. The scrotal pouch was crepitant, gas was escaping at one or more small openings, the general constitutional symptoms of septicæmia were present, and though I promptly laid open and depleted the tumor at many points, the old man gradually sank and died. Here were two deaths, and as I had been invited to prepare a paper for the Philadelphia Academy of Surgery, by its president, the elder Gross, I selected this subject.

I sent letters to one hundred and fifty physicians requesting them to give me a report of the disasters that had occurred in their practice from the radical treatment of hydrocele. About fifty replied, and from their answers I am enabled to present the following interesting data:

ABSCESSES—from the employment of the seton.

Dr. H. M. "I have had abscesses follow the use of the seton."

Dr. L. I. "In my practice two out of three had abscesses when I used the seton."

Dr. A. N. "With the seton only two abscesses occurred in twenty-eight cases. Of these one was in the scrotal tissues, the other occurred in the pelvis and broke into the bladder; ultimate recovery."

Dr. T. I. "I usually employ a drainage-tube. In one case it was withdrawn by the patient. I restored it and an abscess followed."

Dr. M. A. "I have had abscesses follow the use of the seton."

Dr. C. O. "In a double hydrocele, after failure with tincture of iodine, I employed the seton. Cure on one side with abscess, on the other without. In a case in which tincture of iodine had failed a cure was effected with the seton—and abscess."

Dr. M. C. "In three consecutive cases in which I employed silver wire I had abscesses."

ABSCESSES—from injections of iodine.

Dr. G. R. "I abandoned the tincture of iodine years ago on account of pain and abscesses."

Dr. B. T. D. "I have had repeated abscesses from the use of tincture of iodine—from one to two drachms."

Dr. W. E. "Twenty-five per cent. of my cases treated with the tincture of iodine have had abscesses."

¹ Read before the Philadelphia Academy of Surgery, October 2, 1890.

Dr. D. N. "After injecting the tunica vaginalis testis I purposely scratched the lining of the sac with the canula. In this case a fearful abscess occurred in the scrotal tissues."

Dr. D. R. "I have had suppuration follow the use of tincture of iodine with no remedial effect."

Dr. L. E. "Abscesses and suppuration are no guaranty of a cure. Fifty per cent. of injections with tincture of iodine fail."

Dr. W. P. H. "I injected a healthy adult with tincture of iodine. Intense pain followed, with great local swelling and inflammation. Prompt measures were taken to control the inflammation, but an abscess resulted."

Dr. C. O. L. "I have found injections so unsatisfactory, so likely to give rise to abscess and sloughing, that I never resort to them any more."

SHOCK AND SEVERE PAIN.

Dr. T. L. "Out of ten cases treated with tincture of iodine three injections were immediately followed by excruciating pain; and of the three, one was cured with abscess, and in two, though the injection produced agonizing pain, the result was a failure."

Dr. O. T. "Shock and extreme pain in the testicle followed an injection of the tincture of iodine. The shock and faintness lasted for more than an hour."

Dr. C. R. "I came near having a death in my office from injecting two drachms of deliquesced carbolic acid. Great shock and pain; the patient became cyanotic and pulseless, and but for galvanism I think the man would have died. Still the hydrocele was not cured, and I was obliged to resort to the tincture of iodine to effect a cure."

HÆMATOCELE.

Dr. M. E. "I have had a hæmatocele follow the injection of dilute tincture of iodine, one-third strength."

Dr. H. A. "I was called to see a person suffering from a large hæmatocele. He had a few days previously been tapped and injected with tincture of iodine."

Dr. R. E. E. "I have had one hæmatocele follow tapping and injection with iodine."

ORCHITIS.

Dr. T. L. L. "Two cases of violent orchitis followed the injection of tincture of iodine, U. S. P."

Dr. A. S. H. "Orchitis with persistent hypertrophy of the testicle followed the use of the trocar and subsequent injection with tincture of iodine."

Dr. S. B. R. "I think epididymitis is a very frequent result of injections of tincture of iodine into the sac of the tunica vaginalis."

SLOUGHING OF SCROTUM.

Dr. G. A. R. "I have had the entire scrotum slough after injections of the tincture of iodine. In a second case the entire scrotum sloughed, and the sloughing process extended into the inguinal region—from the use of the official tincture of iodine. I have also had sloughing at the entrance and exit of a seton."

Dr. M. I. N. "I have had sloughing of the scrotum occur in my efforts to cure hydrocele."

Dr. K. I. N. "In a case of very large hydrocele that extended nearly to the patient's knee, there were sloughing and gangrene as the result of attempt at radical cure."

Dr. W. A. R. "I have known sloughing of the scrotum to follow frequently the introduction of the seton."

Dr. P. I. L. "Gangrene of the scrotum and death occurred in a young child into whose tunica vaginalis I had inserted a single silk thread, and which I withdrew in twenty hours."

Dr. C. O. L. "I have witnessed sloughing of portions of the scrotum from injections."

Dr. M. A. R. "I have often seen sloughing of the scrotum after using the seton."

Dr. M. E. A. "Slight sloughing of the scrotum followed the injection of two ounces of port wine. It was left in the sac about twenty minutes."

Dr. C. R. "I had a case of hydrocele from which I withdrew three pints. Repeated simple tapings three or four times. Then I injected tincture of iodine, U. S. P. Sloughing of scrotum, exposure of both testicles, and narrow escape from death."

Dr. B. G. S. "When I was a medical student I witnessed the sloughing of the entire scrotum and narrow escape from death as the result of injection of tincture of iodine."

Dr. B. T. R. "Sloughing of the scrotum and pyæmia has occurred twice in my practice—once after injecting tincture of iodine, and once after the use of a seton."

Dr. A. L. L. "Sloughing followed the injection of iodine in a case in which a hæmatocele occurred, and to relieve which incision was employed."

Dr. S. T. O. "I have had sloughing follow excision of a portion of the tunica vaginalis testis."

Dr. R. O. S. "After injection with tincture of iodine the scrotum sloughed and the testicle perished. In this case the patient had hurt his scrotum the day before while riding a fractious colt."

Dr. L. E. A. "Sloughing and exposure of the testicle followed the injection of the tincture of iodine, two drachms. In this case the man went on a spree after the injection."

Dr. W. W. W. "My preceptor, a clinical teacher

¹ Treatment not given.

and eminent surgeon, came near losing a patient; after introducing a seton violent inflammation and extensive sloughing."

Dr. W. W. W. "My colleague in his practice had the upper part of the scrotum and cord slough away after the injection of a twenty-per-cent. solution of carbolic acid."

ALARMING SYMPTOMS—*developed in the course of treatment, with narrow escape from death.*

Dr. G. A. "I came near losing a case recently in the employment of my favorite method—the seton. The man certainly had a narrow escape from death."

Dr. W. I. R. "In a case under my care in which two flaxen threads were introduced, there were profound constitutional disturbance, high fever, profuse perspiration, and for a time matters looked very gloomy and threatening."

Dr. C. A. R. "In one case, where both testicles were exposed after using a silver-wire seton, the patient pulled through by the skin of his teeth. He had a most serious septic involvement, with numerous abscesses and prolonged tedious recovery."

Dr. B. G. S. "In one case, after injecting tincture of iodine my patient came near perishing, and escaped after sloughing of the scrotum."

Dr. J. W. H. "I saw a child five years old treated with the seton. Violent symptoms. The patient was alarmingly ill for several days. Belly became tympanitic and all the symptoms of localized peritonitis were present. In this case a single silk thread was introduced and permitted to remain twenty-eight hours. The operator was a practical hospital surgeon."

Dr. J. W. H. "I injected a robust fireman with deliquesced carbolic acid. Violent inflammation followed with vomiting, tympanites, high temperature and rigors. An abscess formed, free incisions were made, and the patient slowly recovered."

DEATHS.

Dr. T. I. F. "I have known a death to follow simple aspiration of a hydrocele, *i. e.*, emptying it with an aspirating needle without subsequent injection."

Dr. P. R. C. "Death followed incision of the scrotal pouch to relieve hydrocele, ten days after the operation."

Dr. L. S. P. "A death occurred in my practice in a case in which I employed a single silk thread. The child died from septicaemia and gangrene. The thread was only left in twenty hours."—Reported in the *Annals of Surgery*.

Dr. B. Y. R. "I have known death to follow the use of the exploring needle without injection."

Dr. O. H. A.¹ "Death from septicaemia followed the injection of alcohol."

Dr. W. G. P. "Death followed in about ten days after the injection of tincture of iodine in an old negro under my care."

Dr. A. N. D. "My preceptor lost a case from injecting the tincture of iodine. He was a famous clinical teacher and had had large experience in the treatment of hydrocele."

Dr. B. F. N. "I saw a case in a dissecting-room that I recognized as having been injected a short time before in a college clinic. The scrotum was greatly distended."

Dr. R. O. C. "I have known death to follow ten days after the simple evacuation of a hydrocele with a small trocar."

Dr. S. E. X. "I have never had a death in my own practice from the treatment of hydrocele, but I witnessed one that occurred in the practice of a neighboring physician."

Dr. A. T. L. "When a medical student I witnessed death following the treatment of hydrocele."

Dr. W. R. R. "Two deaths have occurred in my practice from incision for the radical cure of hydrocele with thickened sac. One operation resulted in pyaemia, the other in gangrene of the scrotal tissues."

The following is a condensed tabular report of the cases:

Casualties.	Number of surgeons reporting.	Number of cases operated on.
Death ²	12	13
Sloughing of scrotum	14	17
Abscesses ⁴	14	...
Narrow escape from death	4	4
Pyaemia, with ultimate recovery	5	6
Hæmatocele	4	4

A glance at the list of casualties shows that abscesses are very frequent. Some of my correspondents attribute the occurrence of abscesses to their own carelessness. They think that the canula probably slipped, and that a part of the injection was thrown into the connective tissue of the scrotum. Such a mishap is possible, but not in any degree probable.

When a hydrocele is tapped two conditions should be borne in mind: one, *that the sac is tense and tough*—it is often distended almost to bursting. The second condition is that the trocar so universally

¹ Alluded to in the opening of the paper.

² This case is of doubtful value. My informant did not examine the scrotal tumor nor make an autopsy.

³ Deaths: 1, mode of treatment not stated.

3, from aspiration without injection.

4, injections with tincture of iodine.

1, injections with alcohol.

1, from the use of the seton.

3, following incision into the sac.

⁴ For list of abscesses see body of paper.

used for withdrawing the fluid is a *blunt instrument*; hence, when it is thrust through such a dense, tough, tense membrane a hole is formed which, when the canula is withdrawn, will permit of the passage of fluids either way. This view is sustained by clinical observation. It is an almost universal experience that a puncture of the sac, whether by a surgical needle or by an extremely fine operating or hypodermic needle, will be followed by leakage until the sac is emptied. Some of my contributors have employed no other method than tapping for many years. It is plain, therefore, that the puncture permits fluids to pass *from* the sac. Again, it is clinical experience that hæmatocele may follow the puncture of the sac. In my own opinion, blood in a varying degree *always* pours into the sac after the withdrawal of the canula. If capillary vessels only have been transfixed the hæmorrhage will not be great; but if vessels of considerable size have been cut, a hæmatoma may be formed—as has been reported—the size of a foetal skull at full term.

It seems, therefore, readily demonstrable that after the use of the trocar fluids may flow from the sac-walls into the sac-cavity, and from the cavity into the connective tissue. Hence, when my correspondents confess that abscesses occur from injecting the cellular tissue, and are due to their own carelessness, I dismiss the confession, since it admits too much and accounts for too little.

The graver conditions, reported by fourteen of my correspondents, of sloughing of the scrotum occurring after injections and the use of the seton, are to be explained by excessive inflammation. The swelling that arises, sometimes the result of recklessness on the part of patients, and sometimes due to the injected fluid or seton, transcends the limit of nutrition. The nutrient supply, never great in the scrotal tissue, is choked, and the tissues starve. The general sloughing is only an exaggeration of the milder and more controllable abscess.

But a class of mishaps of the gravest character remain to be disposed of—those cases in which septicæmia occurs. Every death, I believe, was from this cause, and the question arises, What is the pathology? It has long been a clinical observation that old hydroceles with hypertrophied walls do not collapse as do young and recent hydroceles. In all chronic cases the fluid, at first, flows from the canula in a full stream, but stops flowing long before the sac is empty. Now, many clinical teachers claim that the reason the tincture of iodine fails, is that the operator is not careful to empty the sac entirely before injecting it; the operator, therefore, kneads the sac, and in a few moments the fluid begins to flow from the canula in a stream. A repetition of the kneading process brings, after a few minutes, a second flow of fluid, and thus, by a little delay and

patience, the operator entirely empties the sac. But alas, the patient must pay dearly for the surgeon's perseverance! The emptying of that thickened sac was possible *on one condition only*, viz., the introduction of an amount of air equivalent to the amount of fluid to be displaced. With an open canula in the hydrocele, just so much fluid escaped as the compression of the atmosphere could force out. The fluid from a tapped hydrocele flows out, not because the tissues of the hydrocele are contractile; the flow is due to atmospheric pressure, and when atmospheric pressure has a hypertrophied sac to deal with, the fluid ceases to run the moment that equilibrium is established. To act further on the walls of the sac and to drive out more fluid are impossible; hence, air enters the canula, and with it the tendency to a vacuum is overcome, and the fluid flows.

The injection is now thrown into a sac emptied, it is true, of hydrocele fluid, but filled *with air*. What follows? The injection lights up inflammation; new products are thrown out; heat, moisture, air, and decomposing blood, in a closed sac, offer a field for germ-proliferation second to none in the domain of surgery; and septicæmia, the result of putrid absorption, occurs.

The interrupted flow of fluid from an old hypertrophied hydrocele may be imitated by a glass bottle, to which an elastic India-rubber bladder is attached, with perforated rubber tube, extending throughout the bladder and to the bottom of the bottle. This apparatus represents a hydrocele upon which the atmosphere can act to a certain degree, but which cannot be wholly compressed. If the bladder and bottle are now filled with water and inverted, the fluid will flow in a stream until the rubber bladder is emptied; but the bottle, which cannot contract, remains full. But in a few moments air will enter the tube and run bubbling through the water in the bottle, when water will again flow through the pendant tube. It will flow for but a moment, since only a little air found its way through the tube, and only a little fluid can escape to equalize it; but, after a few minutes, more air will rush bubbling through the bottle, and be immediately followed by a jet of water from the tube. Thus, little by little, the bottle will be *emptied of water and filled with air*.

But, it will be asked, how about the three deaths from excision? Had I never had any experience with the open method I would be at loss to explain them, but experience has taught me that the best principles will miscarry when executed in a faulty manner.

In one of my cases of incision septicæmia developed and bid fair to do serious mischief, but when I extended the incisions to give dependent drainage, improvement promptly resulted.

Few surgeons, I am convinced, do their first open operation perfectly. The opened and emptied sac shrinks somewhat, the length of the incision is shortened, the sac becomes a cup for the retention of secretions, and serious, if not fatal mischief results. No experienced surgeon is satisfied with an opening that will admit "two finger-ends," yet such operations are performed and denominated *incisions*. The open method demands that the whole interior of the sac shall come under scrutiny; that the excess of tissue in the sac shall be retrenched, unhealthy granulations, laminated fibrin, and all diseased tissue removed; and that ample dependent and unobstructed drainage is established.

A few practical considerations will conclude this article. Most of the casualties reported occurred at a period when modern surgical views were unknown. Some of the accidents may be traced, no doubt, to want of care in the performance of the operation. The trocar and canula may be said to be unsurgical instruments, because they are uncleanly instruments, and the smaller they are the more unlikely they are to be clean. So, too, with a seton; none but the modern surgeon would think of using sterilized silk, and there can be no doubt that uncleanly materials have often imparted a disease of greater magnitude than that which they were intended to cure.

If I may be permitted to express a preference for a mode of treatment I shall unqualifiedly endorse the open method. By no other method is anything like a diagnosis arrived at. True, before using the trocar care is taken that it be not thrust into a hernia or a sarcoma, but when the elimination is made and the surgeon is sure that fluid is present, if he be asked the cause of the fluid or the condition of the sac, the testicle, or the epididymis, he can reply with conjectures only.

By the open method the eye is enabled to see and the fingers to feel all parts of the sac, and if the operation is done with surgical skill and surgical completeness there will be no unpleasant sequelæ and no tardy recoveries.

The contributors¹ to this article were either men who had devoted their lives especially to surgery or men of large general surgical experience. Two inferences may be drawn from their contributions, namely:

That either their methods must have been very faulty and their results very unfortunate; or, that the surgical treatment of this affection in the hands

of the profession generally has not been honestly reported.

If it be said that the methods were faulty in pre-antiseptic days, it must also be confessed that all employed the same methods. If it be said that the operators were unfortunate, I reply that among the most unfortunate are names that add lustre to American surgery.

I shall let the reader form his own conclusions upon the *second* inference. For myself I will simply say that clinical assistants can give a longer list of disasters than clinical professors. I will not say in regard to this operation that surgeons would make a misstatement, but I am convinced that they have wonderfully short memories.

1604 SPRUCE STREET.

DISCUSSION,

In discussing this paper DR. WILLIAM HUNT said that his experience with the treatment of hydrocele has been so favorable that he had no adverse results to report. He recalled an abscess or two in hospital work, especially with the use of the seton, and while there were cases that have not recovered promptly after the use of iodine and carbolic acid, as well as after the open method of treatment, he recalled no untoward results. He asked Dr. Allis whether his record had any reference to the time before the introduction of antiseptic methods. Formerly, in the instrument-rooms of hospitals, there was no instrument so dirty as the trocar, because the essential parts were hidden from view; and the question arises, How much did that have to do with the accidents noted?

DR. WILLIAM G. PORTER said that he was much surprised to hear of the great mortality of operations for hydrocele. His own experience has been almost uniformly favorable, although he has had one case in which the injection of iodine was followed by death, in an old man. In that case the patient's age was apparently the only contraindication, and there were no symptoms of septic trouble, death apparently being due to exhaustion seventy-two hours after the operation.

The subject is one in which we are all interested, because all surgeons are constantly called upon to perform the operation. His preference is for iodine, and with the single exception mentioned he has seen no bad results from it, and can recall but one case in which it failed to cure.

Last spring he had an interesting case of hydrocele, in a child less than two years of age. Such cases he has almost always succeeded in curing by the external application of iodine and evaporating lotions, but in this case external applications had no effect. He then tried simple tapping, but this also failed, and after the fluid reaccumulated twice he used the seton, which was followed by cure. On account of the tender age of the patient, he was afraid to inject iodine.

He recently had a rather embarrassing experience, and one which he has not seen described. He was called to operate on an ordinary hydrocele, which he had examined by transmitted light, and which he was satisfied was a true hydrocele. He plunged a trocar into the centre of the sac without difficulty, but on withdrawing the

¹ I have purposely withheld the names of my contributors. Some of them generously told me to make any use of their names and correspondence that I desired. But so long as the surgical faculties in our great colleges make no reports of their casualties I will not subject my contributors to the unjust aspersions that their sad results were attributable to lack of skill.

canula, to his great consternation no fluid followed. He knew that the trocar had penetrated the sac, and he moved the instrument in various directions, but could not get a drop of fluid. He then ran a long probe through the canula in all directions, but still failed to get any fluid. He then tried to aspirate fluid by means of a long-nozzled syringe, but without success. Examining the swelling again by transmitted light, it was found perfectly translucent. On moving the trocar again, a drop of mucus-like substance came out and the fluid began to escape. He has not used the open method, as the injection of tincture of iodine has been satisfactory.

DR. JOHN B. DEEVER said that his experience with the tincture of iodine was limited, but that he has operated on a large number of hydroceles by the open method, and has seen bad symptoms follow but once. He opens the tumor from the top of the scrotum to the fundus, and dissects out the parietal layer of the tunica vaginalis. The one unfortunate sequel occurred because he was in a hurry, and was not careful to see that all hæmorrhage was arrested. A hæmatocele followed, which broke down and suppurated. The patient was etherized, the broken-down clot removed, and the parts rendered aseptic and drained. The patient made a good recovery. Success in this operation depends upon perfect cleanliness, complete arrest of hæmorrhage, and draining. He always uses a large rubber drainage-tube.

While recently operating for the radical cure of hernia, he attempted to remove the entire sac, and disturbed the parts so much that in forty-eight hours the man had an acute hydrocele. Ten days later he successfully operated on the hydrocele.

He thought that the results recorded by Dr. Allis could in most cases be attributed to the introduction of germs by dirty instruments. In the use of tincture of iodine, if there is but one sac, the operation should be successful; but if there are two or three sacs not in communication with each other, the operation will fail.

His experience in the treatment of hydrocele in children is not large, but he has succeeded in bringing about a cure by tapping and scarifying the tunica vaginalis with the end of the canula. He has not done the open operation in children, although, should the occasion arise, he would not hesitate to do it. He would first try tapping and scarifying, unless these had previously been done. In cases of recurrent hydrocele he would do the open operation. The pain after the use of tincture of iodine is considerable, and epididymitis, or even peritonitis, might follow, but such results are not to be expected after the open treatment.

DR. J. HENRY C. SIMES said that in the treatment of hydrocele his experience has been chiefly with tincture of iodine. During the past two or three years, in order to prevent the very severe pain which so often follows the injection of the iodine, he has injected through the canula two drachms of a five-per-cent. solution of muriate of cocaine, which is allowed to remain in the sac for a few minutes, and then drained off. The iodine is then thrown in, and it is a very exceptional occurrence for the patient to complain of pain. He has occasionally employed the open method, and with success, but the tincture of iodine has given such good results that he does not resort to the open operation until the iodine has failed.

DR. J. EWING MEARS said that he was somewhat surprised at the results presented by Dr. Allis, and was disposed to think ample reasons were given by those who discussed the paper for the want of success and the results that have been reported. Unclean instruments and the failure to hold the canula properly in place, so that the fluid escapes into the connective tissue, are, without doubt, to blame.

He has practised all the methods of treating hydrocele. Formerly it was the custom to inject iodine and allow it to escape, and often the iodine was diluted. Then, principally under the teachings of Professor Agnew, a certain quantity of iodine was introduced and allowed to remain. He has never had untoward results after either method. In his experience the first has occasionally failed, but the second never. He has excised the sac, which is the accepted treatment in chronic hydrocele in which the tunica vaginalis has undergone changes and is much thickened.

There is no operation which he performs with more care, both in hospital and in private cases, than the injection of iodine in the treatment of hydrocele. He prepares the patient, and invariably keeps him in bed a week after the operation. The custom of some surgeons and physicians to inject a hydrocele sac in their offices and send the patient home is dangerous. His own results he believes have been influenced by the care he has taken. He is careful that the canula is clean, and even before the days of antiseptic methods he used hot water and other cleansing methods. Now he uses antiseptic methods in preparing the instruments before operating.

He would hesitate to accept the results reported by Dr. Allis as the results of properly-conducted methods of treatment.

In closing the discussion, DR. ALLIS said that he had brought the subject before the Academy because every one in the medical profession is sometimes called upon to operate for hydrocele. His object was to let those who do not practise surgery know that this is a true surgical operation. Many, who would not dare to perform excision or incision, would tap; but he thinks that free incision is a far simpler operation than tapping, and infinitely safer.

In reference to Dr. Porter's case, in which a seton was used, Dr. Allis said that he had reported four cases in which the seton was used in young children. In one of his own cases a child had convulsions with other general symptoms twenty hours after the operation. It could not be determined whether the hydrocele or the seton caused these symptoms, for the child was in the teething period, and recovered from the operation, but he believed that the irritation of the seton had something to do with the symptoms. Dr. S. W. Gross had a case in which alarming reaction followed the use of a single silk thread. Dr. Pilcher, of Brooklyn, lost a case in which a seton had been used for twenty-four hours.

Dr. Allis said that more cases of abscess and sloughing have occurred from this operation than any of us think. The experiences of our hospitals and college clinics would show that the operation of injection is a serious one if we could learn the results. Even the elder Gross had cases of abscess and sloughing after the operation. One surgeon states that he almost had a

death in his office from the injection of carbolic acid. Another states that he has had as much pain from carbolic acid as from iodine. Dr. Packard had said to the speaker: "I wish you would tell us how it is that we have the patient almost dying from the pain, and yet fail to cure the hydrocele." These are matters of common surgical experience.

Dr. Allis accepted all that Dr. Deaver had said. In some of the reported cases the operator states that he made the opening large enough to introduce two or three fingers, but such an incision is entirely too small in a hydrocele the size of a foetal head. When it collapses it will close such an opening and unless a free incision is made there will be a well of pus to deal with.

In regard to the trocar, he had intended to mention uncleanness as one cause of the sequelæ. Every one knows that the trocar is *par excellence* an instrument that is difficult to clean. After it is cleaned it should be passed through an alcohol flame, and even then there is reason to distrust it.

It is always a difficult matter to say what the origin of hydrocele is. One writer believes that twenty-five per cent. of the failures are due to disease within the sac, or of the testicle, or epididymitis. If the open method is employed the disease can be seen. No hydrocele should be injected if the fluid drawn off is not of a normal color. If the color is dark or chocolate, some injury has probably occurred, or there is some other disease.

The use of cocaine, original with Dr. Simes, is, doubtless, valuable.

All operations of this character should be done with scrupulous care as to cleanliness.

In conclusion Dr. Allis said that he thought no more important matter could be brought before the medical profession than the treatment of hydrocele.

THE TREATMENT OF TUBERCULOSIS.¹

BY LAWRENCE F. FLICK, M.D.,
OF PHILADELPHIA.

In considering the treatment of tuberculosis it is necessary to keep constantly in view the anatomical construction and the physiological function of the affected part, and the etiology and pathology of the disease. Looking at the subject from these different standpoints the following principles can be laid down:

First. That whatever extraneous matter gets into the system enters through the medium of the blood, either by the way of the alimentary canal, by the lymphatic system, or by venous or arterial absorption, and that therefore the bacillus tuberculosis must find its way into the system in this way.

Second. That tuberculosis is strictly a local disease, no matter how many organs or parts may be affected, and that whatever the constitutional symptoms, they are always the result either of interference with the physiological action of some important organ or organs of the body, or of the absorption

of some foreign body, the product of tuberculosis, into the system.

Third. That tuberculosis is a specific infectious disease, which can only arise from some other case of tuberculosis, and that when it gets a foothold in any part of the body it can, and probably will, extend to other parts of the body.

Fourth. That tuberculosis has a predilection for those parts or organs of the body in which the circulation is sluggish, as a result either of inactivity of the organ or part, or because of former inflammation.

Fifth. That tuberculosis is always the same disease, whatever part of the body it may affect.

Sixth. That tuberculosis is frequently primarily situated in some unimportant organ of the body, and is overlooked until it affects either the lungs or the brain.

Seventh. That the gravity of the prognosis of tuberculosis is in proportion to the importance of the part of the body affected in carrying on the functions of life.

Eighth. That the improvement and curability of tuberculosis are dependent upon the amount of tubercular deposit, the location, the number of organs or parts implicated, the activity of the parts implicated, and upon the anatomical construction and the anatomical encasement of the organ or part.

Cases of tuberculosis, for the purpose of studying the treatment, can be divided into two classes, namely, those that are accessible to mechanical treatment, such as the use of the knife, caustics, and powerful germicides, and those that are not accessible to such treatment.

The cases of tuberculosis accessible to mechanical treatment are lupus, tuberculosis of the superficial glands, of the cartilages, tendons, joints, and bones, of the perineum and peritoneum, of the vermiform appendix, of the male and female reproductive organs, of the mucous membranes of the mouth, nose, throat, eye, and ear. The treatment of tuberculosis by the knife has at all times been looked upon as a doubtful procedure, and the awe with which it has been regarded by some seems akin to superstition. But this fear, like many of the superstitions of the past, was founded on observation of clinical facts which were inexplicable, but which, in the light of modern research, are easily understood. It was observed that after cutting into tubercular affections general tuberculosis frequently developed, to which the patient rapidly succumbed. We now know that this result is due to the absorption of tubercular matter into the circulation by the cut surface and its deposition in other parts of the body. With our modern knowledge of the infectious nature of tuberculosis it becomes imperative that the knife be not used unless the entire tubercular mass can be re-

¹ Read before the Philadelphia County Medical Society, November 12, 1890.

moved intact, and without reinoculating the patient. This can sometimes be done in tuberculosis of the superficial glands, of the vermiform appendix, of the reproductive organs, of the tendons, cartilages, bones, and joints, and in lupus. In tuberculosis of the accessible mucous membranes and in lupus, caustics and strong germicides are no doubt preferable to the knife. In tuberculosis of the peritoneum washing out and dusting the cavity with iodoform have given good results. It seems to me that where the tubercular deposit is confined to the peritoneum, repeatedly dusting with iodoform might be practised. In tuberculosis of the perineum good results are seldom obtained by the knife, and surgical interference had better not be attempted. Packing the sinuses with iodoform and constitutional treatment will give much more satisfactory results. In tuberculosis of the tonsils caustics are preferable to the knife.

The majority of the cases of tuberculosis come under the second class, namely, those which are inaccessible to mechanical treatment, or in which mechanical treatment is undesirable. For all such cases certain general laws can be laid down:

First. Whatever will sterilize the tubercular deposit without interfering with the nutrition of the body, will cure tuberculosis.

Second. Whatever tends to improve nutrition will help to cure tuberculosis.

Third. Whenever the tubercular deposit sets up excessive inflammation, rest is of primary importance.

The destruction of the bacillus tuberculosis is of course the principle underlying all treatment, whether it be accomplished by medicine or by nature's conservative methods. Throughout the entire civilized world there is at present great activity among medical men in search of a substance which will destroy the bacillus tuberculosis without interfering with the nutrition of the body. That such a substance exists, and will ultimately be discovered, can scarcely be doubted, now that science has indicated to us the way in which to proceed in our investigations. Even at the present time encouraging reports come from our own city, from Germany, and from France, which may soon be followed by the announcement that the discovery has been made. The experiments of Grancher, Martin, Dixon, and Koch, demonstrate that the development of the bacillus tuberculosis can at least be checked in organisms very similar to the human body, and these are the beginnings of a new line of study which may lead up to the discovery of the long-looked-for secret.

We have already in our armamentaria many drugs which will destroy the bacillus tuberculosis, either directly or by depriving it of its nutrition; but they all interfere, more or less, with the nutrition of the

body, or destroy the tissues when taken in large enough doses to produce the desired result upon the bacillus. Some of the drugs, however, in safe doses, will enable nature sufficiently to produce a cure. Prominent among the remedies which have been used as germicides in tuberculosis are iodoform, creasote, terebene, sulphuretted hydrogen, carbonic acid, boric acid, arsenic, mercury, tar, ethereal oils, chloride of calcium, salts of gold and silver, iodine, hydrocyanic acid, and the aniline preparations. Each of these has been praised and condemned, but, no doubt, each has merit in its way. My own experience is limited to a few of them, and to these I will confine my remarks.

Iodoform.—If there is any drug in the Pharmacopœia of which I can truthfully say that I believe it has curative powers over tuberculosis, it is iodoform. I have used it in a large number of cases for a period of four or five years, and I am quite sure that I can ascribe to its use improvement in many cases, and cure in not a few. Iodoform acts best in the early stage of the disease, before there is any breaking-down of the deposit, and before the circulation is entirely cut off. It can be given by either the mouth or the bowel, or through the skin. Sometimes it disagrees with the stomach, but just as frequently proves beneficial by preventing fermentation. I usually prescribe the drug in capsules with pepsin, pancreatin, and some bitter extract. When the tubercular deposit is in the pelvis I use the iodoform in the form of suppositories. One of the most effective ways of using the drug, however, is by inunction. I order it in cod-liver oil, in which it is soluble in the proportion of one part in fifteen, and direct that the body be thoroughly rubbed with the solution from half an hour to an hour once or twice a day. The benefits resulting from this method of using iodoform are most striking. I have experimented with the drug hypodermically, but am not as yet ready to make any report as to its use in this way.

Creasote.—Creasote has attracted much attention during the last few years as a specific for tuberculosis, and has been much discussed in the journals. It has been experimentally proved to be an excellent germicide, and has given good results clinically when administered in sufficiently large quantities. There is often difficulty in getting it into the system in large quantities. I myself have never been able to give it with any satisfaction except by inhalation, the drug being volatilized by hot air. In this way I have obtained most excellent results from its use, not, as I believe, by any local action upon the lungs, but through absorption into the blood. A good way to give it is dissolved in some hot liquid. When well diluted it is not so apt to disturb the stomach. Its administration should be begun in small doses,

and gradually increased until very large quantities are taken.

Terebene.—Terebene is very similar in its action to creasote, but is much more pleasant to take. I have given it with advantage by inhalation, volatilized by hot air. It is a good substitute for creasote when the latter drug is decidedly objectionable to the patient.

Boric acid.—Boric acid is such an excellent germicide, and even in large doses is so harmless to the system that theoretically it should be an excellent remedy for tuberculosis. A year ago I gave it a fair trial, but while I saw some benefit from its use, it interfered with digestion to such an extent that I abandoned it. It seemed to be of most benefit in checking fever and night-sweats in the last stages of the disease.

Dr. Grancher, of France, has recently reported a series of experiments and clinical observations bearing upon the use of this drug in tuberculosis, which are quite encouraging. He did not find that it disagreed with the stomach.

Sulphuretted hydrogen.—Sulphuretted hydrogen figured very conspicuously a few years ago as a specific remedy for tuberculosis, but it did not earn for itself a permanent reputation. It was then looked upon as a new remedy, but in reality it had been used nearly a century previously under the name of the "cow-stable cure." Although it has some efficacy its application is so objectionable that it has properly been laid aside.

Carbonic acid, arsenic, mercury, the ethereal oils, chloride of calcium, salts of gold and silver, iodine, hydrocyanic acid, and the many germicide remedies, descriptions of which appear in the medical journals, has each had its champion, but my own experience is too limited with them to enable me to give an opinion. I find excellent use for mercury given at intervals, to prepare the system for other remedies, but I have never used it as a germicide. Arsenic receives great encomiums and no doubt deserves them, but I cannot join in the praises as I am not sure that I have seen any benefit from it. Iodine is a powerful germicide, and all of its preparations are no doubt more or less useful in tuberculosis; iodoform, of which iodine is the active agent, is however probably the best form in which to give the drug. Tar and hydrocyanic acid form the bases for many of the home-cures for consumption, and no doubt possess merit; but as with many of the other drugs mentioned, we probably do not yet know the most efficacious method of administering them.

The stock of germicide remedies for tuberculosis is already quite large and is constantly being added to. It is said that when there are many remedies for a disease there is no cure, but this is more apparent than real. Many roads may lead to a city,

but some may take you there more quickly than others, and therefore many remedies may cure a disease but some may do it more speedily than others. Each of the germicide remedies for tuberculosis would no doubt cure the disease, could it be given in large enough doses without injuring the tissues, and some of them do cure the disease in the doses in which they can safely be given. May we not then confidently look forward to the discovery of new remedies in the near future, or methods of applying the old ones, which will always cure the disease, and in a comparatively brief time? Every remedy finds a field of usefulness in the hands of a well-informed, judicious physician; and when to them are added the many adjuvants, in the way of drugs, gymnastics, climate, etc., by which we can aid nature in her efforts to restore and maintain the integrity of the living organism, it can certainly no longer be said that tuberculosis is an incurable disease.

In all living organisms there undoubtedly resides a power to resist parasitic encroachment. In the human body this power has been supposed to reside in the blood and to be exercised by little bodies called phagocytes. Quite recently efforts have been made to impeach the phagocyte, but all seem to agree that the protective power resides in the blood. We certainly do know from clinical observations that in proportion to the excellence of nutrition, which is best indicated by a healthy condition of the blood, the system is capable of obstructing the inroads of disease. This is true of all diseases, but it seems to be especially true of diseases which have a long incubation period and which run a slow course. Persons whose nutrition is at *par* seem to have power to resist tuberculosis under ordinary exposure; and persons who have fallen victims to the disease seem to be able to cast it off or to resist its encroachments if their digestive and nutritive powers can be readily restored. Upon these two clinical observations much of the classical treatment of tuberculosis was wisely constructed, and whatever germicide remedies may be discovered, improvement in nutrition must always constitute the groundwork of successful treatment.

Inasmuch as the nutrition of the body is so dependent upon the digestive apparatus, the stomach is the first thing to be looked after in the treatment of tuberculosis. If there is any fault in the method of taking food, such as hurried and insufficient mastication, it must be corrected. The nature of the food taken ought to be carefully inquired into, with a view to ascertain whether it is sufficiently nourishing and whether it is suited to the idiosyncrasies of the patient; and if it is not suitable, the proper diet should be prescribed. If it is found that certain

kinds of food cannot be digested by the patient, such foods should be given artificially digested. When the stomach is congested, as indicated by a large, heavily-coated tongue, a light diet should be insisted on and remedies prescribed to relieve the congestion, such as bismuth, bicarbonate of sodium, and magnesia. Small doses of iodoform sometimes act well in such cases. When the stomach and liver are sluggish, usually indicated by a rather pale, indented, slightly-coated tongue, pepsin and hydrochloric acid in some bitter mixture will give good results. When intestinal digestion is bad, pancreatin should be given. As soon as the digestive apparatus has been restored to good working order, forced nutrition should be adopted. Easily-digested food ought to be given at frequent intervals, and every precaution taken against burdening the stomach with indigestible food. All forms of starchy food which have been prepared in such a way as to imbed the starch globules in grease should be scrupulously avoided. Milk should form a large part of the diet, and should be taken at meals, between meals, and at bedtime. If milk disagrees with the stomach, the habit of drinking it can and should be formed by taking a small quantity at first and gradually increasing the amount. By perseverance the stomach can readily be trained to take from five to six pints of milk a day, in addition to one meal of solid food. Meat should be partaken of but once a day, and then in as large quantity as possible. Vegetables and fruit should be freely eaten, and a little light wine at or after meals will be of benefit. Cod-liver oil should be taken, beginning with small quantities and gradually increasing until a tablespoonful three times a day is tolerated, but the greatest care should be exercised that it does not disturb the stomach. The use of oxygen after meals, inhaled slowly for half an hour, will aid digestion and be of great benefit. Quinine, strychnine, and other tonics and stomachics may be given to stimulate the appetite. When the stomach becomes fatigued under this forced labor it should be permitted to rest for a few days, the same regimen being then resumed. During this time of rest it is well to give a dose of calomel, followed by magnesia.

Next in importance to attention to the digestive apparatus of the patient, is to see that he gets plenty of fresh air and the proper amount of exercise. Outdoor life is of the greatest importance, but it does not seem to make much difference where that outdoor life is obtained. The one thing to be kept in the mind of the physician in directing fresh air for his patient is home comforts. Unless the patient can command home comforts, do not send him away. Were every medical student compelled, as part of his education, to make the rounds of the health-resorts of the country on the same amount

of money that the average health-seeker has at his command, fewer patients would be sent to health-resorts. Altitude and temperature have less to do with either the production or cure of tuberculosis than is generally supposed. The benefits of altitude can be artificially produced by compressed and rarefied air, and if the patient's mind be relieved from the classical errors about the pernicious influence of cold and moisture, he will be found to do as well in one climate as another, provided he protects himself properly by clothing and has the courage to go out in all kinds of weather. In reality, warm climates are more conducive to the development of tuberculosis than are cold.

Regarding exercise, the physician should be very explicit, as the tendency is to take either too much or too little. Outdoor life and exercise must not be looked upon as synonymous terms. As long as there is a disposition to fever or even to acceleration of the pulse, exercise had better be as nearly passive as possible. Gradually, as the disposition to inflammatory action decreases, and as the various organs of the body begin to perform their functions more normally, exercise may become more active and may be taken in larger amount. At no time, however, must it be carried to the point of fatigue. A good form of exercise is that of driving nails with a light hammer, or, when the patient becomes stronger, that of chopping wood. There is considerable advantage in exercising chiefly with the upper extremities. Pulmonary gymnastics are of great assistance in re-developing an injured lung, but they must not be practised until all disposition to inflammatory action has ceased. Pulmonary gymnastics and excessive exercise during the inflammatory stage are apt to cause the disease to extend, and to make the course of the case much more rapid.

In the acute stage of the disease, when the tubercular deposit sets up an inflammatory condition, bodily rest and remedies that will quiet the excited heart and allay excessive reflex irritation, form an important part of the treatment. During this stage the best place for the patient is in bed. When the tubercular deposit is in the pleura or lung, considerable benefit will be derived from strapping the affected side with adhesive plaster.

Digitalis has a very soothing effect in this stage, and will often contribute considerably to a cure. During the latter part of the eighteenth century it held the reputation among many of the best practitioners in England of being a specific for the disease. Beddoes, who probably saw as many cases of phthisis as any man who ever practised medicine, used the following strong language concerning digitalis in 1803:

"In cases of pulmonary disease, where the presence of tubercle was indicated by every symptom, and where

they seemed ready to break out in open ulcers, I have verified the efficacy of digitalis; and I daily see my patients advancing toward recovery, with so firm a pace that I hope consumption will henceforth be as regularly cured by the foxglove as ague by the Peruvian bark. Could we have a single auxiliary for the foxglove, such as we have many substances for the bark, I should expect that not one case in five would terminate as ninety-nine in a hundred have hitherto terminated."

The only evidence of this great faith in the efficacy of digitalis as a cure for tuberculosis at the present day is found in the confidence still shown in the Niemeyer pill. I have myself used the drug largely in the early stage of the disease for five or six years, and my conviction is that the old faith was founded on correct observation, and that we have in digitalis a most useful remedy for the inflammatory stage of tuberculosis. For the reflex irritation and the resulting symptoms of cough and sometimes of vomiting when the tubercular deposit is in the lungs, and of convulsions and vomiting when the deposit is in the brain or its membranes, opium, bromides, and chloral are the chief remedies. Opium should be used only when it is absolutely indispensable, but when the reflex symptoms are such as to harass the patient, and to interfere with his progress toward recovery, and when no other drug will control them, opium should be unhesitatingly used in quantities large enough to produce the desired effect. In such cases the effect of opium is apparently magical, not only in restoring the confidence of the patient, but in improving his appetite and general condition. As soon as practicable, however, the dose should be decreased and the administration of the drug soon entirely stopped. Where there is bronchial secretion opium should be entirely eschewed. In such cases bromide of ammonium will sometimes act very well. For the reflex symptoms of tubercular deposit in the brain and its membranes, the bromides and chloral are indicated. For the elevation of temperature which is encountered during the inflammatory stage, rest in bed and the administration of digitalis are usually sufficient; but if the temperature is not reduced in a few days quinine, antifebrin, or antipyrine may be given. When the tubercular deposit is in the lung much benefit may be derived by counter-irritation, either in the shape of dry cups, fly-blisters, croton oil, or tartar emetic plaster. In the most acute stage, dry cups are preferable, inasmuch as they can be frequently applied. Fly blisters, whilst painful, are the most powerful external remedy at our command, and are especially useful when the inflammatory condition has reached the subacute stage. They should be repeatedly applied until all evidence of inflammation has disappeared. Croton oil and tartar emetic plaster may be used as substitutes for fly-blister if the patient is too timid to use the latter.

When tuberculosis has reached the stage in which symptoms are caused by the absorption of products of the disease, or because of the interference with the functions of diseased organs, the treatment necessarily becomes symptomatic. For the high temperature of sepsis the administration of large doses of quinine is the safest treatment. Antifebrin and antipyrine are too depressing to be given in this stage. Boric acid given in doses of from ten to fifteen grains every three or four hours is worthy of trial. For the sweats which follow the fever, usually called colliquative night-sweats, belladonna and aromatic sulphuric acid are the standard remedies, and are usually efficient. Agaricin has recently been attracting some attention as an excellent remedy for this condition, but I have had no experience with it. The patient should be cautioned not to use too many bedclothes at night, as sweats are sometimes aggravated thereby. It is also a good plan to sponge the body with warm alcohol.

For the irritative diarrhoea which frequently comes on in the latter stages of tubercular pulmonitis, without any involvement of the intestinal glands, a light, easily-digested diet, and bismuth, bicarbonate of sodium, and pancreatin are indicated. When the diarrhoea is due to tuberculosis of the intestinal glands it will be found difficult to control, but it can be temporarily checked by such astringents as catechu, tannic acid, and acetate of lead. A warm, dry application to the abdomen in the form of a hot bran-bag will be very soothing and beneficial.

The attacks of palpitation which are so distressing and which are apt to come on when there are large cavities in the lungs, I have found are almost instantly relieved by opium and digitalis. Great care must be exercised not to confound this palpitation with the dyspnoea accompanying extensive tubercular deposit and excessive bronchial secretion which it very closely resembles. In the latter conditions oxygen will give relief, and opium must be absolutely avoided. In these cases the reflex symptoms should be met by bromide of ammonium and counter-irritation.

In treating these various symptoms during the latter stages of tuberculosis it must always be borne in mind that they are mere symptoms and not the disease; and that in reality they are often the phenomena accompanying nature's frantic efforts to get rid of a foe. They must never be allowed to assume such a magnitude in the physician's mind as to make him forget his main purpose, namely, to cure the disease.

In conclusion, it may be well to say a word about the methods of medication in the treatment of tuberculosis. The methods usually employed are

inhalation and administration by the mouth. Because of the anatomical construction of the respiratory system and its physiological action, and also because of the pathology of tuberculosis, medication by inhalation is restricted to those substances which exist in or can assume the form of vapor or gas, and which can at once enter the blood by endosmosis or be carried into it through the lymphatic system. Topical applications of remedies to a tubercular lung by way of the respiratory tract are useless, because the tubercular deposit is in the lung-tissue where it cannot be reached except through the circulation. All such plans of treatment, therefore, as the inhalation of hot air as a germicide, and of medicated vapors for their local effect, are based upon misconceptions, and can have no curative influence. Many substances can, however, readily enter the blood through the lungs, and inhalation is an excellent method of administering germicide remedies that can be converted into vapor or gas. The observation has recently been made that chloroform is very destructive to the bacillus tuberculosis, and very good results are reported from the daily inhalation of a small quantity of chloroform. This method of medication is as yet an unexplored field, but it promises well and is worthy of attention.

Medication by the mouth is the method most in use in the treatment of all diseases, and it is the one almost entirely depended on in the treatment of tuberculosis. In giving such substances as have the same physiological and therapeutic effect, in whatever chemical form they are used, medication by the mouth is by far the most convenient and most desirable method. Many substances, however, have different actions in different chemical forms, and with them, however destructive to germs they may be in the test-tube, we cannot know what their germicide and therapeutical powers will be after they have been acted upon by the salivary, gastric, and intestinal juices. It seems to me, therefore, that only such germicides should be administered by the mouth as do not have their therapeutical effect altered by chemical action before reaching the circulation. For drugs whose germicidal powers are changed by chemical action, intravenous injection, hypodermic injection, and inunction offer excellent methods, as in these ways the substances can be brought in contact with the bacillus tuberculosis without undergoing any chemical change. My short experience with inunctions convinces me that they are preferable to giving the drugs by the mouth. The entire question of medication is, however, as yet an open one, and offers an excellent field for clinical observation.

736 PINE STREET.

MEDICAL PROGRESS.

Cocaine Anaesthesia Obtained by Means of Cataphoresis.—

DR. ARTHUR HARRIES (*Lancet*, October 25, 1890) writes that where local anaesthesia is required, cocaine hydrochlorate, administered by means of cataphoresis instead of hypodermically, should be employed. In a number of cases in which he adopted this method the anaesthesia was complete, and toxic symptoms of the drug were not observed. He uses a ten-per-cent. solution of cocaine, with which the flannel-padded positive electrode, corresponding to the size of the area to be anaesthetized, is saturated. The large negative electrode is soaked in salt solution and placed in a suitable position on the surface of the body. A continuous current of twenty-five milliamperes is then passed for forty minutes. Dr. Harries believes that the causes of failure with this method are: That the currents used are too weak, and applied for too brief a time; that the operator does not understand the apparatus; and that a reversed current is used.

The Therapeutic Action of the Sulphate of Cinchonidine.—

H. DE BRUN has recently made an elaborate study of the therapeutic action of the sulphate of cinchonidine in the treatment of the various types of malarial fever. He has carefully observed and recorded fifty-eight cases in private and hospital practice, especially at the Beyreuth Hospital. From the results observed he concludes:

1. That the sulphate of cinchonidine, administered in the amounts in which sulphate of quinine is usually given, is able to prevent the symptoms of paludal poisoning as effectually as the latter remedy. After one or two doses of the first drug the return of the paroxysms of intermittent fever is prevented.
 2. The value of the sulphate of cinchonidine in malarial cachexia is doubtful. The drug arrests the destruction of the blood-cell, and rapidly diminishes the general paludal anaemia. It also causes the hæmatin of the blood to increase. It quickly reduces the size of both the congested liver and spleen, but is powerless if the enlargement is due to sclerosis. It also quickly relieves the pulmonary congestions of paludal origin as well as albuminurias dependent upon malarial congestion of the kidneys.
 3. It is an excellent remedy in the treatment of intermittent neuralgias, and possibly may prove useful against other neuralgias due to common causes.
 4. The sulphate of cinchonidine has often produced beneficial results in those cases where the sulphate of quinine has failed to do any good.
- The superiority of the cinchonidine salt is also noticed, in that it is better tolerated by the stomach, and much less apt to produce ringing in the ears and vertigo.
5. The moderate price of the cinchonidine salts is another important consideration.—*Revue de Médecine*, September 10, 1890.

The Use of Sodium Salicylate in Pleural Effusions.—In 1883 Aufrecht recommended the administration of sodium salicylate in all cases of pleural effusion. TETZ (*Therapeutische Monatshefte*, No. 7, 1890), who has used the remedy for two years, states that his success completely confirms the views of Aufrecht. He considers that its

action on pleural effusions is as striking as on rheumatism, and his experience has been that the average time of treatment is less than with other methods. Although it acts most promptly, and certainly in recent cases, he has seen collections of fluid of several weeks' duration yield to it—not only primary but also secondary pleurises. As an example, he reports the case of a woman, about forty years of age, in whom a left-sided pleurisy had existed for two and a half weeks. Ordinary treatment had very little effect, but on the day following the administration of sodium salicylate the effusion had diminished, and all traces disappeared by the fourth day. In another case of long-standing effusion for which paracentesis had been proposed, the use of the drug caused the accumulation to disappear rapidly.

In regard to secondary pleurisy, the author reports a case of tuberculosis with pleural effusion, in which the salicylate also caused rapid subsidence, the diagnosis being confirmed by an autopsy several months later.

Tetz gives the drug in fifteen-grain doses, at first four or five times daily, later three or four times daily for one week. He does not think that the action of the salicylate is that of a diuretic, but that it is a specific.—*Practitioner*, October, 1890.

Salipyrine.—GUTTMANN (*Internationale klinische Rundschau*, September, 1890) reports his results with the use of "salipyrine," a combination of salicylic acid and antipyrine. The compound is a white, odorless powder, with a slight burning taste, freely soluble in alcohol, but almost insoluble in water. Guttman's conclusions are as follows:

1. Salipyrine reduces elevated temperature. In cases of continued high temperature, a dose of thirty grains should be given, followed by four doses of fifteen grains each, at intervals of an hour. The lowest temperature is reached in about four hours after the last dose, the fall being from 3° to $3\frac{1}{2}^{\circ}$ F. More or less profuse sweating usually accompanies the fall.
2. In acute rheumatism salipyrine is as efficient a remedy as the other compounds of salicylic acid, but has no influence in preventing relapse.
3. In the treatment of chronic articular rheumatism the drug is also useful.
4. Salipyrine rarely produces disagreeable symptoms, even if given for two weeks in daily doses of ninety grains. In but one case was an eruption observed. This resembled the eruption produced by antipyrine, and disappeared in a few days.
5. The color of the urine is not affected by the administration of salipyrine, but the chloride of iron test shows the presence of a salicylate.
6. To reduce temperature, the dose of salipyrine should be twice that of antipyrine.

The Treatment of Partially-amputated Fingers.—ZATVARNITZKY reports the case of a boy who four hours before coming under observation, nearly lost the distal phalanx of his right forefinger by accidentally bringing it in contact with a circular saw. The end of the finger was still attached by a small cutaneous bridge. The author washed the injured part with sublimate solution, arrested hæmorrhage, dusted the wound with iodoform and carefully attached the phalanx to the stump by means

of interrupted sutures and adhesive plaster, and applied antiseptic dressings and a splint. Complete union with good motion followed.

In considering such cases the author concludes that if there is much laceration or contusion of the soft tissues or comminution of the bone, union cannot be hoped for; but that if the injury is of the nature of an incised wound union may be obtained, even when several hours have elapsed since the accident, if the amputated part is not very cold and pale.—*Annals of Surgery*, October, 1890.

Disinfection of the Mouth in Diabetes.—DUJARDIN-BEAUMETZ (*Therapeutic Gazette*, October 15, 1890) refers to the fact that the majority of diabetics have a purulent inflammation of the gums, which may be the starting-point of systemic infection, and insists on the importance of disinfecting the mouth in such cases. The solution which has given him the best results for this purpose is the following:

R.—Boric acid $6\frac{1}{4}$ drachms.
Carbolic acid 15 grains.
Thymol $3\frac{1}{4}$ "
Water 1 quart.

Add to the above:

Spirit of anise $3\frac{1}{2}$ drachms.
Spirit of peppermint 10 drops.
Alcohol 3 ounces.
Cochineal, sufficient to color.—M.

This should be diluted with an equal quantity of water and used freely after eating.

Management of Gonorrhœa.—LANG (*Wiener med. Wochenschrift*, October 2, 1890) discusses some of the causes of the prolongation and complications of gonorrhœa. One of the most important points in the treatment of gonorrhœa is, he thinks, the proper regulation of eating and drinking. In some cases attention to these is all the treatment that is necessary. The injection chiefly used by the author is a solution of sulpho-carbolate of zinc of a strength of from one-fourth to one per cent. Stronger solutions may be employed if a mucilaginous menstruum is used instead of water. It is important to pay attention to the size of the syringe. Patients, if not otherwise instructed, will often use a large syringe, and by injecting too much fluid injure the urethra. Lang uses syringes of three sizes holding respectively, one and a half, two, and three drachms, and to each case orders the size which seems most suitable.—*British Medical Journal*, October 18, 1890.

Ammonium Acetate in the Treatment of Scarlatina.—VIDAL recommends large doses of ammonium acetate in the treatment of scarlatina, and believes that it will also be found useful in the treatment of other exanthemata. In three children suffering from scarlatina to whom he gave the drug in daily amounts of from 35 to 90 grains, the temperature rapidly fell and desquamation was established within four days. In the author's experience the earlier in the course of the disease that the ammonium acetate is given the better are the results.—*Wiener medicinische Presse*, October 5, 1890.

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SATURDAY, NOVEMBER 15, 1890.

THE TREATMENT OF RECTO-VAGINAL FISTULÆ.

IN *La Médecine Moderne*, October 9, 1890, is an article from the pen of PROFESSOR LE DENTU, the author who not long since gave us an excellent work on the *Surgical Diseases of the Kidneys, Ureters, and Suprarenal Capsules* (Paris, 1889, pp. 828). The occasion of Professor Le Dentu's article is the description of a new method of treating recto-vaginal fistulæ. The method consists of the dissection of a crescent-shaped flap, with its convexity tangent to the lower margin of the fistula, sliding this flap up so as more than to cover the fistula, and attaching its under raw surface to a crescentic denuded area, which includes the fistulous orifice. The sutures are held in place either by segments of a metal tube which, like perforated shot, can be compressed, or by sutures tied over a roll of gauze, in the manner of the old quill sutures.

While admiring the author's ingenuity and appreciating his success in the single case to which the method was applied, we cannot feel that we have here a means less difficult than other methods of treating these troublesome cases, and we believe that there is no treatment for recto-vaginal fistula which will always prove successful.

While we say that there is no *treatment*, we would

insist that there are many *treatments*, each of which is excellent and suitable to various classes of case. In other words, we have grouped under the one name *recto-vaginal fistula*, conditions the repair of which may be either the simplest or one of the most difficult of gynecological procedures.

Fistulæ resulting from cancer and syphilis are, as a rule, beyond the pale of relief, while the remediable cases, those arising from perforation of the recto-vaginal septum by pessaries, by trauma in childbirth, by ulceration, or by an imperfectly-unioned septum after the perineal operation for complete tear of the septum, present a host of different appearances, according as the fistula is high or low, transverse or longitudinal, large or small, a direct communication through which the rectal mucosa can be seen from the vaginal side, or communicates by a long sinuous track—all these as well as other factors are important and must be weighed, in determining the best plan for attacking a given case of recto-vaginal fistula.

Through the genius of Emmet, Simon, and others we already have a number of rational procedures, sufficient it would seem to cover all cases; thus we can operate upon the fistula through the rectum, or through both the rectum and the vagina, making a bevelled denudation; or, in small direct fistulæ just above the vaginal orifice, the fistulous track may be dissected out through the vagina and closed from the vaginal side alone.

Splitting the perineum and recto-vaginal septum up to the fistula, cutting out the fistulous track and then sewing up the whole wound, has succeeded in some intractable cases situated near the posterior column. The genius of success and the demon of failure in this work lie, we feel sure, not in the want of a new method which shall simplify—or shall we say complicate—everything, but more in the judgment exercised by the surgeon in his selection of one of the simple methods which we already possess; in the dexterity with which a perfect and even denudation is made; and above all, in the precision with which the sutures are applied—splinting the parts firmly, without constricting them, until the desired union takes place. The surgeon who understands how to use his sutures properly will not need to inject milk into the rectum at the end of the operation to learn if the fistula is closed, nor will he fear that accumulations of gas in the rectum or the passage of feces will break his line of union.

What we here say of operations upon recto-vagi-

nal fistulae applies to all plastic operations in the vagina; it is not new methods we are in need of, but more dexterity and greater skill in applying the old methods. Let our surgeons be truly clever workers with their hands.

SOCIETY PROCEEDINGS.

TRI-STATE MEDICAL ASSOCIATION.

Second Annual Meeting, held in Chattanooga, Tenn., October 14, 15, and 16, 1890.

FIRST DAY.—MORNING SESSION.

The Association met in Turner Hall, and was called to order by the President, Dr. J. B. Cowan, of Tullahoma, Tenn., at 10 A. M. Prayer was offered by the Rev. Charles Hyde.

The remainder of the first session was devoted to introductions, miscellaneous business, and reports of the Executive Committee.

AFTERNOON SESSION.

DR. W. P. McDONALD, of Hill City, Tenn., contributed a paper entitled

REPORT OF A CASE OF CANCRUM ORIS OR GANGRENOUS STOMATITIS.

He was called to see the patient, a girl four years old, on August 5th. She had some fever, the tongue was coated with a brown fur, the surface being more or less fissured, and her general appearance indicated great depression. Her bowels were inclined to be loose, and her abdomen seemed to be somewhat tympanitic. He believed the case to be one of typho-malarial fever, and began treatment by a mercurial purge, which was followed by large doses of quinine and bismuth. This treatment was continued for two days, after which he ordered ten drops of syrup of the iodide of iron after meals, with quinine and bismuth in small doses three or four times a day. This treatment was continued for about ten days, when the patient had greatly improved.

Fourteen days after his first visit he was called to see the patient's mother, whom he found with nearly the same symptoms as those that the child first presented. During his absence from the city, another physician had treated an older daughter, who probably had the same disease. The little child was still improving, but her mouth remained sore. On examining the mother he found several small ulcers on the right side of the mouth, with a general inflammatory appearance of the gums and of the mucous lining of that side of the buccal cavity, with some bleeding from around the teeth. The trouble seemed at first to yield to a mouth-wash of chlorate of potassium and creasote, but on the seventeenth day of the illness the inflammation increased rapidly, the whole cheek became much swollen, and the mucous membrane dark and gangrenous. On August 24th a dark spot about the size of a dime made its appearance externally near the right wing of the nose. This rapidly enlarged, involving the wing of the nose and the adjacent tissues, and on August 25th it had involved the right side

of the nose to the inner canthus of the eye and the upper lip to the median line, and had rapidly spread on the cheek, reaching the point at which the zygomatic muscles cross the masseter. Both the upper and lower teeth on this side became loose and dropped out.

Careful investigation revealed a strumous diathesis in the family, but there was no history of tuberculosis.

According to good authorities, cancrum oris usually occurs as the sequel of other diseases. The statistics of Rilliet and Barthez show that out of 98 cases of this disease, 41 followed measles, 5 scarlet fever, 6 whooping-cough, 9 intermittent fever, 9 typhoid fever, and 7 mercurial salivation.

In Dr. McDonald's cases the questions are, Did the disease occur as a sequel of typho-malarial fever, or was it the result of mercurial salivation.

In discussing this paper, DR. E. T. CAMP, of Gadsden, Alabama, said that he had seen a case similar to the one reported, which he pronounced gangrena oris, the whole of one cheek being destroyed. There was evidence of mercury having been taken in the early part of the illness. The case terminated fatally within a few days. The patient was four or five years old and of the lower class.

DR. JAMES E. REEVES, of Chattanooga, contributed a paper entitled

"ON ALL SIDES A LEARNED DOCTOR."

The author introduced his subject by an earnest plea for higher medical education, stigmatizing cheap medical colleges with no facilities for imparting instruction as the greatest stumbling-blocks in the way of true progress.

He referred to the present tendency to make one-sided physicians, and maintained that the specialist should build on the broad foundation of the general practitioner in order to reach professional eminence.

EVENING SESSION.

DR. ANDREW BOYD, of Scottsboro, Alabama, read a paper on

FRACTURE AT THE ELBOW-JOINT,

and reported several cases. He said that after reduction there are but two positions in which to treat fracture at the elbow-joint, viz., the extended or straight, and the flexed position. The author thinks that the flexed position is the better, for the reasons (1) that in all cases there is danger of ankylosis, and it is much better to have a flexed ankylosed arm than a straight one; (2) that after the splints have remained in place from twenty-five to thirty days, the arm is atrophied and almost helpless; (3) that it is easier to overcome the flexor muscles than the extensors, and a patient can extend an arm with more ease than he can flex it.

MR. SYDNEY B. WRIGHT, of Chattanooga, read a paper on

EXPERT TESTIMONY,

of which the following are the most important points:

1. That the circumstances from which the conclusion is drawn should be fully established.
2. That all the facts should be consistent with the hypothesis.
3. That the circumstances should be of a conclusive nature and tendency.
4. That the circumstances should to a moral certainty

exclude every hypothesis but the one propounded to be proved.

5. That mere circumstantial evidence, unless the chain of circumstances is complete, ought in no case to be relied on where direct and positive evidence which might have been given is withheld by the opposite party.

DR. W. G. BOGART, of Chattanooga, reported a

CASE OF NEUROSIS,

in a girl aged seventeen years. The patient was constipated and had a coated tongue and foetid breath. Her temperature was 103°; pulse 115. She had been growing more irritable and less communicative, and had suffered from sleeplessness, pain in the back of the head, and a general feeling of depression for several months. She was placed under treatment and seemed to improve. Six months later she was seized with convulsions, and still later she suffered from amenorrhœa.

An interesting feature of the case is that the patient passed three different varieties of worms. A small, black-headed worm, one-half inch long, which had decided vermicular movements; another, with a head like that of a pin; and a third, a small thread-like worm two inches in length.

A paper on

NEURALGIA,

by DR. W. S. GAHAGAN, of Chattanooga, was then read by title.

SECOND DAY—MORNING SESSION.

The first paper was read by DR. J. C. SHEPARD, of Winchester, Tennessee, and was entitled

A FEW REMARKS ON THE FEVERS OF MIDDLE TENNESSEE AND THEIR TREATMENT.

He said that the great malarial period extended from the time of the settlement of the country up to about 1840, during which time all the fevers of the country were malarial and periodical. The great typhoid period commenced about 1840 and continued until near 1860. During this period malarial fevers were almost, if not entirely, unknown, and typhoid was everywhere dominant and every case was typical. About 1860 there was a return of malarial fever, but in connection with typhoid fever. This was the typho-malarial period, which continued for fifteen or twenty years.

About 1880 the characteristic symptoms both of typhoid and of malarial fevers commenced to disappear, and are still growing less frequent. This is the period of *fusion*. We now have only one fever, which is a continued fever, neither typically typhoid nor malarial, and not even typically typho-malarial. There is not now, and there never was, a continued malarial fever, *per se*, in Middle Tennessee.

Of treatment but little was said. Cold baths the speaker considered impracticable, and new antipyretics should be given with caution. He believed that too much quinine is used in the continued fevers of Middle Tennessee.

DR. L. P. BARBER, of Tracy City, Tennessee, followed with a paper entitled

A CONTRIBUTION TO THE STUDY OF THE CONTINUED FEVERS OF THE SOUTH,

in which he said that the nosology and etiology of the continued fever of the South are now justly attracting

much attention, and form a subject upon which much is yet to be learned. Only a close and accurate study of the disease by competent observers, in many and different localities, a thoughtful comparison of these observations, and free discussion, will advance our knowledge of its nature, and shed light on the vexed question of its cause.

Encouraged by the recent vigorous inquiry and research in this direction, Dr. Barber began, some fifteen months since, to keep a record of all cases of fever that occurred in his private practice, and the comparison of the cases has helped him toward a decision as to the nosology of continued fever.

Dr. Barber then reported a large number of interesting cases, after which the two papers on continued fever were discussed.

DR. G. W. DRAKE, of Chattanooga, in opening the discussion, said that the human body is an aggregation of cells, and that among these cells are found, in various tissues, certain loose migratory and amoeboid cells—phagocytes—which he would call the police force intended to protect the tissues against invasion. When the germs of typhoid fever attack Peyer's patches and the solitary glands, the migratory cells from the adjacent parts, and possibly from distant parts, rush to the conflict. The result is great destruction both of microbes and of phagocytes, and their putrefying remains produce *typhotoxin* and probably other ptomaines.

He believed typhoid fever to be produced by germs once external to the body, but expressed a "judicious scepticism" as to whether Eberth's bacillus is the *sole* cause, and its presence absolutely necessary in all cases.

DR. JAMES E. REEVES said that the malarial influence was undoubtedly slowly, but surely, travelling northward.

DR. J. A. LONG, of Long's Mills, Tennessee, related his experience in McMinn County, Tenn. The fevers there have the symptoms of typhoid fever, but there are many non-typical cases. Some are cases of typhoid in a malarial diathesis. He believed that a few cases of malarial fever continue because quinine is given in too small doses.

DR. H. BERLIN, of Chattanooga, presented some photo-micrographs as an evidence of the existence of microbes in these fevers.

DR. GEORGE A. BAXTER, of Chattanooga, suggested the use of salol and naphthol in the treatment of the fevers.

DR. J. B. MURFREE, of Murfreesboro', Tennessee, thought it impossible for two fevers to exist at the same time in one person, and said that there is no typho-malarial fever. We have mild cases of typhoid as well as of other fevers. The use of antiseptics with proper nutrition and stimulation is the proper method of treating typhoid.

DR. REEVES asked Dr. Murfree if he thought typhoid was contagious.

DR. MURFREE said it was to a certain extent.

DR. P. D. SIMS, of Chattanooga, said: "Our fevers are not all either malarial or typhoid. We have another fever dependent upon filth. It may be called *sewage* or *drainage* fever. It is adynamic in type and is liable to take on most of the symptoms of specific typhoid fever. This is the fever now upon us, arising from the con-

tinued and increasing pollution of our water-supply from sewage sources."

DR. T. Y. PARK, of Peavine, Georgia, suggested that as these fevers present the symptoms both of typhoid and of malarial fever, it is convenient to use the term typho-malarial, as we cannot make the public understand the technical points of difference, and we cannot examine our cases for the microorganisms.

DR. GEORGE A. BAXTER, of Chattanooga, presented a paper on

SOME NEW USES OF SILICATE OF SODIUM.

The paper chiefly had reference to a jacket made by a new process of hardening the silicate, which it is claimed is an improvement on all other jackets, inclusive of the plaster-of-Paris, leather, woven wire, or watch-spring jackets now in use for the treatment of spinal injuries or disease. It is lighter, equally durable, equally immobile when on, and can be removed at any time and adjusted to any lateral pressure desired.

AFTERNOON SESSION.

DR. RICHARD DOUGLAS, of Nashville, contributed a paper on

ABSCESS OF THE LIVER,

which, he said, is the result of absorption of some morbid product from the intestine, or from some ulcerated surface. The bacteria enter the circulation and are deposited in the liver, where an abscess is formed. This may be without a rise of temperature.

Dr. Douglas then reported the following case: Four months after an attack of typhoid fever the patient had a chill, slight pyrexia, and a trace of jaundice, these lasting only a few days. There was a globular swelling in the right hypochondriac region; the only local symptoms of which were dull pain and tenderness. The diagnosis was confirmed by aspiration. A free incision let out eight ounces of inodorous pus, and the patient recovered in four weeks.

DR. E. E. KERR, of Chattanooga, reported a

CASE OF GALL-STONES,

and was followed by

DR. J. B. MURFREE, of Murfreesboro', Tennessee, who read a paper on

UTERINE FIBROMA.

A uterine fibroma, he said, is a morbid growth developed within the walls of the uterus, and is composed of muscle-cells, fibro-plastic material, and cellular tissue, and is due to a perversion of nutrition. It is non-malignant and homologous in its structure. Pain, hæmorrhage, rectal and cystic irritation, indigestion, dropsy, and exhaustion are some of its results. The growths may threaten life by hæmorrhage, inflammation, septicaemia, or pressure.

The treatment is divided into four methods: (1) Symptomatic; (2) General (by medicines); (3) Electrolysis, and (4) Operative.

By the first method we simply treat the symptoms as they arise and ward off threatened dangers. Hæmorrhage is the most troublesome symptom, and is best treated by quietude, opiates, etc. The hot douche and the tampon are also useful. The general treatment is

by the administration of medicines, which are powerless to cause the absorption of a fibrous tumor, and do no good, except to build up the general system.

Ergot is sometimes given to cause the death and expulsion of the tumor, but the speaker has no confidence in it.

The treatment by electrolysis has met with some success, and is worthy of trial. It is especially adapted to the interstitial variety.

Surgical treatment is resorted to for the permanent relief of uterine fibroma. It consists in the removal of the tumor by traction, torsion, excision, enucleation, excision, écrasement, or hysterectomy. When the tumor projects into the uterine cavity it is best removed by excision. When it is interstitial it should be treated by electricity. When subperitoneal it had better be left alone unless the woman's life is a burden and death is threatened, when it should be removed by abdominal section. Hysterectomy should never be resorted to as an ideal operation, but only as a forlorn hope. But conditions do arise when it is eminently proper and should unhesitatingly be performed.

In discussion DR. W. H. WATHEN, of Louisville, Kentucky, said that the more frequently he opens the pelvis the more often does he find that his diagnosis was not correct. Apostoli's method he considered dangerous in private practice, and to be successful in its application the operator must be the most exclusive of specialists. The tumor may be lessened in size, but there are few, if any, cures. A fibroma should not be interfered with unless it gives trouble.

DR. RICHARD DOUGLAS wished to emphasize what Dr. Wathen had said regarding Apostoli's treatment. From observation at his clinics and inquiries in the hospitals in Paris, he had not found any cases that were cured, but he had heard of two cases that died as the result of the treatment, one of these being in the practice of Dr. Keith, of London.

DR. L. P. BARBER, of Tracy City, Tennessee, said that Apostoli's method certainly promises much, notwithstanding the remarks of Drs. Douglas and Wathen. He saw something of the results of the treatment during the past summer, and Dr. Franklin H. Martin, of Chicago, told him that of about 200 cases only three had received no benefit. About fourteen per cent. received temporary benefit, eighty-four per cent. were symptomatically cured, and there were a number of actual cures. Dr. Martin has had no deaths in all his experience with electricity. The result, to the unprejudiced, is certainly in favor of the proper use of electricity.

DR. MURFREE, in closing, said that he felt that much could be accomplished by Apostoli's method.

DR. W. H. WATHEN followed with a paper entitled

LAPAROTOMY *versus* ELECTRICITY IN ECTOPIC PREGNANCY,

in which he said that electricity, the only foeticidal means now recognized as orthodox by physicians who practise destroying the life of the foetus, without abdominal section, in ectopic pregnancy, is no longer used for this purpose when the pregnancy has continued longer than three and a half or four months, and is seldom used after the third month. At this time the foetus cannot

be killed except by electro-puncture, and the complications and the deaths consequent upon this practice have been so numerous that the most radical advocates of electricity are afraid to introduce the electrodes into the gestation-sac. The use of electricity in extra-uterine pregnancy is practically confined to the United States, and while it is advocated by men of recognized ability and learning in obstetrics and gynecology, Dr. Wathen believes that very soon it will have no support.

The speaker then entered into an argument in favor of abdominal section, for the difficulty and sometimes the impossibility of diagnosing extra-uterine pregnancy in the early months are so manifest that it would be ridiculous to claim that in all the reported cases pregnancy existed; while in the cases in which the abdomen is opened a positive diagnosis may be made by seeing the embryo, or the chorionic or placental villi. If the embryo or fetus in an extra-uterine pregnancy is killed by electricity, a more or less diseased condition of the pelvic structures is left that endangers the health or the life of the woman, the dangers usually being increased as pregnancy advances. But if abdominal section is done, there is no obstructed tube or other pathological condition left, and if the woman recovers from the immediate effects of the operation she is entirely cured. Her life is no longer in jeopardy because of the danger of pelvic abscess, sepsis, or exhaustion following an effort to discharge the suppurating contents of the gestation-sac through fistulous tracks into the rectum, vagina, bladder, or through the abdominal walls. If we could eliminate the cases in which there was an error of diagnosis we would find that the mortality from the use of electricity and the bad after-results are far in excess of the mortality from abdominal section in the practice of experienced operators.

(To be continued.)

CORRESPONDENCE.

To the Editor of THE MEDICAL NEWS,

SIR: In your issue of October 18th, I notice, with regret, a foot-note to my article on "Acromegaly." The late publication of the paper was due to a misunderstanding on my part, and was not the fault of Dr. Hays.

Yours very truly,

J. E. GRAHAM.

Toronto, October 27, 1890.

NEWS ITEMS.

New York Academy of Medicine.—On November 20th the new building of the New York Academy of Medicine, which has just been completed, will be opened with appropriate ceremonies. Dr. Loomis will give an address of welcome, Dr. E. L. Keyes will deliver the anniversary address on the "New York Academy of Medicine," while Dr. Abraham Jacobi will speak upon the subject of "Our Library." Dr. Billings, Dr. Weir Mitchell, Dr. Fritz, and Dr. Fordyce Barker are also expected to be present and to speak. Invitations have been sent out to many of the prominent men in the different cities of the Union asking them to be present, and the occasion will undoubtedly be one of which both New York and the medical profession throughout the country may be proud.

Dr. Bartholow's Retirement.—Referring to the statement in THE MEDICAL NEWS of November 1st, as to the cause of Dr. Bartholow's retirement from the faculty of the Jefferson Medical College, it affords us pleasure to state that in the resolution of the Board of Trustees the only reason assigned is that his arduous and unremitting labor in the duties of his chair had rendered a period of rest imperatively necessary for him. If permitted, we would be glad to publish the correspondence of the Trustees with Dr. Bartholow, which bears emphatic testimony to the distinguished ability and untiring zeal with which he has for so many years discharged the duties of his position.

Uncertified Deaths in Great Britain.—The assertion was recently made on the floor of the British House of Commons that 15,000 persons die and are buried in Great Britain, each year, without a death-certificate having been given as required by law.

OFFICIAL LIST OF CHANGES IN THE STATIONS AND DUTIES OF OFFICERS SERVING IN THE MEDICAL DEPARTMENT, U. S. ARMY, FROM NOVEMBER 4 TO NOVEMBER 10, 1890.

By direction of the Secretary of War, BASIL NORRIS, *Colonel and Surgeon*, and GEORGE M. STERNBERG, *Major and Surgeon*, are appointed members of a Board of Officers to meet, at the call of the senior officer thereof, in San Francisco, Cal., to examine such officers of the Corps of Engineers as may be ordered before it, with a view of determining their fitness for promotion, as contemplated by the Act of Congress approved October 1, 1890.—Par. 5, S. O. 261, A. G. O., Washington, D. C., November 7, 1890.

By direction of the Secretary of War, CHARLES T. ALEXANDER, *Lieutenant-Colonel and Surgeon*, and JOHNSON V. D. MIDDLETON, *Major and Surgeon*, are appointed members of a Board of Officers to meet, at the call of the senior officer thereof, at the rooms of the Board of Engineers, Army Building, New York City, to examine such officers of the Corps of Engineers as may be ordered before it, with a view of determining their fitness for promotion, as contemplated by the Act of Congress approved October 1, 1890.—Par. 4, S. O. 261, A. G. O., Washington, D. C., November 7, 1890.

By direction of the Acting Secretary of War, leave of absence for four days is granted WILLIAM D. CROSBY, *Captain and Assistant Surgeon*.—Par. 1, S. O. 259, A. G. O., Washington, November 5, 1890.

LA GARDE, LOUIS A., *Captain and Assistant Surgeon*.—Is detailed as a member of a Board for duty in connection with the World's Columbian Exposition, and will report by letter to Major Clifton Comly, Ordnance Department, member of the Board of Control and Management of the Government Exhibit to represent the War Department.—Par. 1, S. O. 260, A. G. O., Washington, November 6, 1890.

BACHE, DALLAS, *Lieutenant-Colonel, Surgeon, and Medical Director Department of the Platte*.—Is granted leave of absence for one month.—Par. 6, S. O. 82, Department of the Platte, Omaha, Nebraska, November 1, 1890.

OFFICIAL LIST OF CHANGES IN THE STATIONS AND DUTIES OF THE MEDICAL CORPS OF THE U. S. NAVY FOR THE WEEK ENDING NOVEMBER 8, 1890.

EDGAR, J. M., *Passed Assistant Surgeon*.—Ordered to the U. S. S. "San Francisco," November 10, 1890.

SPRATLING, L. W., *Assistant Surgeon*.—Ordered to the U. S. S. "San Francisco," November 10, 1890.

WHITE, CHARLES H., *Medical Inspector*.—Ordered to the U. S. S. "San Francisco," November 10, 1890.

SCOTT, HORACE B., *Passed Assistant Surgeon*.—Placed on the Retired List, October 31, 1890.

ASHBRIDGE, RICHARD, *Passed Assistant Surgeon*.—Surveyed and sent to Hospital, Philadelphia, Pa.

KENNEDY, R. M., *Assistant Surgeon*.—Detached from Navy Yard, League Island, and ordered to the U. S. Training-ship "Richmond."

ATLEE, L. W., *Assistant Surgeon*.—Ordered to the Navy Yard, League Island, Pa.

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KOCH'S DISCOVERY.

SPECIAL CABLE DISPATCH TO THE MEDICAL NEWS.

A FURTHER COMMUNICATION ON A CURE FOR TUBERCULOSIS.¹

BY PROFESSOR ROBERT KOCH, M.D.,
OF BERLIN.

In an address delivered before the International Medical Congress I mentioned a remedy which conferred on the animals experimented upon an immunity against inoculation with the tubercle bacillus, and which arrested tuberculous disease. Investigations have now been carried out on human patients, and these form the subject of the following observations. It was originally my intention to complete the research, and especially to gain sufficient experience regarding the application of the remedy in practice, and its production on a large scale before publishing anything on the subject; but in spite of all precautions, so many accounts have reached the public, and in such an exaggerated and distorted form, that it seems imperative, in order to prevent false impressions, to give at once a review of the position of the subject at the present stage of the inquiry. It is true that this re-

view can, under these circumstances, be only brief, and must leave open many important questions.

The investigations have been carried on under my direction by Dr. A. Libbertz and Stabsarzt Dr. E. Pfuhl, and are still in progress. Patients were placed at my disposal by Professor Brieger, from his polyclinic; Dr. W. Levy, from his private surgical clinic; Geheimrath Drs. Fränzel and Oberstabsarzt Kohler, from the Charite Hospital; and Geheimrath v. Bergmann, from the surgical clinic of the University. I wish to express my thanks to these gentlemen.

As regards the origin and the preparation of the remedy, I am unable to make any statement, as my research is not yet concluded. I reserve this for a future communication.¹

The remedy is a brownish, transparent liquid, which does not require special care to prevent decomposition. For use, this fluid must be more or less diluted, and the dilutions are liable to undergo

¹ Translated from the original article published in the Deutsche medicinische Wochenschrift, November 14th, 1890.

¹ Doctors wishing to make investigations with the remedy at present, can obtain it from Dr. A. Libbertz, Lueneburger Strasse, 28, Berlin, N. W., who has undertaken the preparation of the remedy with my own and Dr. Pfuhl's coöperation, but I must remark that the quantity prepared at present is but small, and that larger quantities will not be obtainable for some weeks.

decomposition if prepared with distilled water. As bacterial growths soon develop in them they become turbid, and are then unfit for use. To prevent this, the diluted liquid must be sterilized by heat and preserved under a cotton-wool stopper, or, more conveniently, prepared with a one half per cent. solution of phenol.

It would seem, however, that the effect is weakened both by frequent heating and by mixture with phenol solution, and I have therefore always made use of a freshly-prepared solution. Introduced into the stomach the remedy has no effect. In order to obtain a reliable effect it must be injected subcutaneously, and for this purpose we have exclusively used the small syringe suggested by me for bacteriological work. It is furnished with a small India-rubber ball and has no piston. This syringe can easily be kept aseptic by the use of absolute alcohol, and to this we attribute the fact that not a single abscess has been observed in the course of more than a thousand subcutaneous injections.

The place chosen for the injection, after several trials of other places, was the skin of the back between the shoulder-blades and the lumbar region, because here the injection led to the least local reaction—generally none at all, and was almost painless. As regards the effect of the remedy on the human patient, it was clear from the beginning of the research that in one very important particular the human being reacts to the remedy differently from the animal generally used in experiments, namely, the guinea-pig. A new proof for the experimenter of the all-important law that experiment on animals is not conclusive, for the human patient proved extraordinarily more sensitive than the guinea-pig. As regards the effect of the remedy, a healthy guinea-pig will bear a subcutaneous injection of 2 cubic centimetres, and even more, of the liquid without being sensibly affected; but in the case of a full-grown healthy man 0.25 cubic centimetre suffices to produce an intense effect. Calculated by the body-weight, one-fifteen-thousandth part of the quantity which has no appreciable effect on the guinea-pig acts powerfully on the human being.

The symptoms arising from an injection of 0.25 cubic centimetre I have observed after an injection

made in my own upper arm. They were briefly as follows: three to four hours after the injection there came on pain in the limbs, fatigue, inclination to cough, difficulty of breathing, which speedily increased in the fifth hour, and were unusually violent. A chill followed, which lasted almost an hour. At the same time there were nausea, vomiting, and a rise of body temperature to 39.6° C.

After twelve hours all these symptoms abated, the temperature fell, and on the next day it was normal. A feeling of fatigue and pain in the limbs continued for a few days, and for exactly the same period of time the site of injection remained slightly painful and red. The smallest quantity of the remedy which will affect the healthy human being is about 0.01 cubic centimetre, equal to 1 cubic centimetre of the one-hundredth dilution. As has been proved by numerous experiments, when this dose is used reaction in most people shows itself only by slight pains in the limbs and transient fatigue. A few showed a rise of temperature to about 38° C.

Although the effect of the remedy in equal doses is very different in animals and in human beings, if calculated by body-weight, in some other respects, there is much similarity in the symptoms produced, the most important of these resemblances being the specific action of the remedy on the tuberculous process, the varieties of which I will not here describe. I will make no further reference to its effects on animals, but I will at once turn to its extraordinary action on tuberculosis in human beings. The healthy human being reacts either not at all, or scarcely at all, as we have seen, when 0.01 cubic centimetre is used. The same holds good with regard to patients suffering from diseases other than tuberculosis, as repeated experiments have proved; but the case is very different when the disease is *tuberculosis*. A dose of 0.01 cubic centimetre injected subcutaneously into tuberculous patients causes a severe general reaction as well as a local one.

I gave children aged from two to six years one-tenth of this dose, that is to say, 0.001 cubic centimetre—very delicate children only 0.0005 cubic centimetre—and obtained powerful, but in no way

dangerous, reaction. The general reaction consists in an attack of fever, which usually begins with rigors, and raises the temperature above 39° , often up to 40° , and even 41° C. This is accompanied by pain in the limbs, coughing, great fatigue, and often sickness and vomiting. In several cases a slight icteroid discoloration was observed, and occasionally an eruption like measles on the chest and neck. The attack usually begins four to five hours after the injection, and lasts from twelve to fifteen hours. Occasionally it begins later and then runs its course with less intensity.

The patients are very little affected by the attack, and as soon as it is over feel comparatively well, generally better than before. The local reaction can be best observed in cases in which the tuberculous affection is visible; for instance, in cases of lupus, changes take place which show the specific anti-tuberculous action of the remedy to a most surprising degree. A few hours after an injection into the skin of the back—that is, in a spot far removed from the diseased area on the face or elsewhere—the lupus begins to swell and to redden, and this it does generally before the initial rigor. During the fever the swelling and redness increase, and may finally reach a high degree, so that the lupus-tissue becomes brownish and necrotic in places where the growth was sharply defined. We sometimes found a much swollen and brownish spot surrounded by a whitish edge almost one centimetre wide, which again was surrounded by a broad band of bright red.

After the subsidence of the fever the swelling of the lupus-tissue gradually decreases and disappears in about two or three days. The lupus-spots themselves are then covered by a soft deposit, which filters outward and dries in the air. The growth then changes to a crust, which falls off after two or three weeks, and which—sometimes after only one injection—leaves a clean, red cicatrix behind. Generally, however, several injections are required for the complete removal of the lupus-tissue; but of this, more later on. I must mention as a point of special importance that the changes described are exactly confined to the parts of the skin affected with lupus. Even the smallest nodules and those most deeply

hidden in the lupus-tissue go through the process and become visible in consequence of the swelling and change of color, whilst the tissue itself in which the lupus-changes have entirely ceased remains unchanged. The observation of a lupus-case treated by the remedy is so instructive, and is necessarily so convincing, that those who wish to make a trial of the remedy should, if possible, begin with a case of lupus.

This specific action of the remedy in these cases is less striking, but is as perceptible to eye and touch as are the local reactions in cases of tuberculosis of the glands, bones, joints, etc. In these cases swelling, increased sensibility, and redness of the superficial parts are observed. The reaction of the internal organs, especially of the lungs, is not at once apparent, unless the increased cough and expectoration of consumptive patients after the first injections be considered as pointing to a local reaction in these cases. The general reaction is dominant; nevertheless, we are justified in assuming that here, too, changes take place similar to those seen in lupus-cases. The symptoms of reaction above described occurred, without exception, in all cases in which a tuberculous process was present in the organism after the use of 0.01 cubic centimetre, and I think I am justified in saying that the remedy will, therefore, in the future, form an indispensable aid to diagnosis.

By its aid we shall be able to diagnose doubtful cases of phthisis; for instance, cases in which it is impossible to obtain certainty as to the nature of the disease by the discovery of bacilli or elastic fibres in the sputum or by physical examination. Affections of the glands, latent tuberculosis of bone, doubtful cases of tuberculosis of the skin, and similar cases will be easily and with certainty recognized. In cases of tuberculosis of the lungs or joints which have been apparently cured we shall be able to make sure whether the disease has really finished its course, and whether there be still some diseased spots from which it might again arise as a flame from a spark hidden by ashes.

Of greater importance, however, than its diagnostic use, is the therapeutic effect of the remedy. In the description of the changes which a subcu-

taneous injection of the remedy produces in portions of the skin affected by lupus, I mentioned that after the subsidence of the swelling and decrease of the redness the lupus-tissue does not return to its original condition, but that it is destroyed to a greater or less extent and disappears. Observation shows that in some parts this result is brought about by the diseased tissue becoming necrotic, even after but one sufficiently large injection, and at a later stage it is thrown off as a dead mass. In other parts a disappearance or, as it were, a necrosis of the tissue, seems to occur, and in such case the injection must be repeated to complete the cure.

In what way this process of cure occurs cannot as yet be stated with certainty, as the necessary histological investigations are not complete; but this much is certain, that there is no question of a destruction of the tubercle bacilli in the tissues, but only that the tissue inclosing the tubercle bacilli is affected by the remedy. Beyond this there is, as is shown by the visible swelling and redness, considerable disturbance of the circulation, and, evidently, in connection therewith, deeply-seated changes in its nutrition which cause the tissue to die more or less quickly and deeply, according to the extent of the action of the remedy. To recapitulate, the remedy does not kill the tubercle bacilli but the tuberculous tissue, and this gives us clearly and definitely the limit that bounds the action of the remedy.

It can influence living tuberculous tissue only, and has no effect on dead tissue; as, for instance, necrotic cheesy masses, necrotic bones, etc., nor has it any effect on tissues made necrotic by the remedy itself. In such masses of dead tissue living tubercle bacilli may possibly still be present, and are either thrown off with the necrosed tissue, or may possibly enter the neighboring and still living tissue under certain circumstances of the therapeutic activity. If the remedy is to be rendered as fruitful as possible this peculiarity in its mode of action must be carefully observed. At first the living tuberculous tissue must be caused to undergo necrosis, and then everything must be done to remove the dead tissue as soon as possible, as, for instance, by surgical interference.

Where this is not possible, and where the organ-

ism is unassisted in throwing off the tissue slowly, the endangered living tissue must be protected from fresh incursions of the parasites by continuous applications of the remedy. The fact that the remedy makes tuberculous tissue necrotic and acts only on the living tissue, helps to explain another peculiar characteristic thereof, namely, that it can be given in rapidly-increasing doses. At first sight, this phenomenon would seem to point to the establishment of tolerance, but since it is found that the dose can, in the course of about three weeks, be increased to five hundred times the original amount, tolerance can no longer be accepted as an explanation. As we know of nothing analogous to such a rapid and complete adaptation to an extremely active remedy, the phenomenon must rather be explained in this way, that in the beginning of the treatment there is a good deal of tuberculous living tissue, and that consequently a small amount of the active principle suffices to cause a strong reaction, but by each injection a certain amount of the tissue capable of reacting disappears, and then larger doses are necessary to produce the same amount of reaction as before.

Within limits, a certain degree of habituation may be perceived as soon as the tuberculous patient has been treated with increasing doses, for so soon as the point is reached at which reaction is as feeble as that of a non-tuberculous patient, then it may be assumed that all tuberculous tissue is destroyed. Then the treatment will only have to be continued by slowly-increasing doses and with interruptions in order that the patient may be protected from fresh infections while bacilli are still present in the organism, and whether this conception and the inference that follows from it be correct, the future must show. They were conclusive, as far as I am concerned, in determining the mode of treatment by the remedy which in our investigations was practised in the following manner. To begin with the simplest case—lupus.

In nearly every one of these cases I injected the full dose of 0.01 cubic centimetre from the first. I then allowed the reaction to come to an end, and then, after a week or two, again injected 0.01 cubic centimetre, continuing in the same way until the reaction became weaker and weaker, and then

ceased. In two cases of facial lupus the lupus-spots were thus brought to complete cicatrization by three or four injections; the other lupus-cases improved in proportion to the duration of treatment.

All these patients had been sufferers for many years, having been previously treated unsuccessfully by various therapeutic methods. Glandular, bone, and joint tuberculosis was similarly treated, large doses at long intervals being made use of. The result was the same as in the lupus-cases—namely, a speedy cure in recent and slight cases, slow improvement in severe cases.

The circumstances were somewhat different in phthisical patients, who constituted the largest number of our patients. Patients with decided pulmonary tuberculosis are much more sensitive to the remedy than those with surgical tuberculous affections.

We were obliged to diminish the dose for the phthisical patients, and found that they almost all reacted strongly to 0.002 cubic centimetre, and even to 0.001 cubic centimetre. From this first small dose it was possible to rise more or less quickly to the amount that is well borne by other patients. Our course was generally as follows: an injection of 0.001 cubic centimetre was first given to the phthisical patient, and from this a rise of temperature followed, the same dose being repeated once a day until no reaction could be observed. We then increased the dose to 0.002 cubic centimetre, until this was borne without reaction, and so on, increasing by 0.001, or at most 0.002 to 0.005, cubic centimetre.

This mild course seemed to be imperative in cases in which there was great debility. By this mode of treatment the patient can be brought to tolerate large doses of the remedy with scarcely a rise of temperature. But patients of greater strength were treated from the first partly with larger doses and partly with frequently-repeated doses. Here it seemed that the beneficial results were more quickly obtained. The action of the remedy in cases of phthisis generally showed itself as follows: Cough and expectoration were generally increased a little after the first injection, then grew less and less, and in the most favorable cases entirely disappeared. The

expectoration also lost its purulent character and became mucous. As a rule, the number of bacilli decreased only when the expectoration began to present a mucous appearance. They then entirely disappeared, but were again observed occasionally until expectoration completely ceased. Simultaneously the night-sweats ceased, the patients' appearance improved, and they increased in weight within from four to six weeks.

Patients under treatment for the first stage of phthisis were freed from every symptom of disease and might be pronounced cured; patients with cavities not yet too highly developed improved considerably and were almost cured, and only in those whose lungs contained many large cavities could no improvement be proved. Objectively, even in these cases the expectoration decreased and the subjective condition improved. These experiences lead me to suppose that phthisis in the beginning can be cured with certainty by this remedy. This statement requires limitation in so far as at present no conclusive experiences can possibly be brought forward to prove whether the cure is lasting.

Relapses naturally may occur, but it can be assumed that they may be cured as easily and quickly as the first attack. On the other hand, it seems possible that, as in other infectious diseases, patients once cured may retain their immunity; but this, too, for the present, must remain an open question. In part, this may be assumed for other cases, when not too far advanced; but patients with large cavities, who suffer from complications caused, for instance, by the incursion of other pus-forming microorganisms into the cavities or by incurable pathological changes in other organs will probably obtain lasting benefit from the remedy in only exceptional cases. Even such patients, however, were benefited for a time. This seems to prove that in their cases, too, the original tuberculous disease is influenced by the remedy in the same manner as in the other cases, but that we are unable to remove the necrotic masses of tissue with the secondary suppurative processes.

The thought involuntarily suggests itself that relief might possibly be brought to many of these severely-afflicted patients by a combination of this

new therapeutic method with surgical operations (such as the operation for empyæma), or with other curative methods, and here I would earnestly warn people against conventional and indiscriminate application of the remedy in all cases of tuberculosis. The treatment will probably be quite simple in cases in which the beginning of phthisis and simple surgical cases are concerned, but in all other forms of tuberculosis medical art must have full sway by careful individualization and making use of all other auxiliary methods to assist the action of the remedy.

In many cases the decided impression was created that the careful nursing bestowed on the patient had a considerable influence on the result of the treatment, and I am in favor of applying the remedy in proper sanatoria as opposed to treatment at home and in the out-patient room. How far the methods of treatment already recognized as curative, such as mountain climate, fresh-air treatment, special diet, etc., may be profitably combined with the new treatment cannot yet be definitely stated, but I believe that these therapeutic methods will also be highly advantageous when combined with the new treatment. In many cases, especially in the convalescent stage, as regards tuberculosis of the brain and larynx, and miliary tuberculosis, we had too little material at our disposal to gain proper experience.

The most important point to be observed in the new treatment is its early application. The proper subjects for treatment are patients in the initial stage of phthisis, for in them the curative action can be most fully shown, and for this reason, too, it cannot be too seriously pointed out that practitioners must in the future be more than ever alive to the importance of diagnosing phthisis in as early a stage as possible. Up to the present time the proof of tubercle bacilli in the sputum was considered more as an interesting point of secondary importance, which, though it made diagnosis more certain, could not help the patient in any way, and which, in consequence, was often neglected.

This I have lately repeatedly had occasion to observe in numerous cases of phthisis, which had generally gone through the hands of several doctors without any examination of the sputum having been

made. In the future this must be changed. A doctor who shall neglect to diagnose phthisis in its earliest stage by all methods at his command, especially by examining the sputum, will be guilty of the most serious neglect of his patient, whose life may depend upon the early application of the specific treatment. In consequence, in doubtful cases, medical practitioners must make sure of the presence or absence of tuberculosis, and then only will the new therapeutic method become a blessing to suffering humanity, when all cases of tuberculosis are treated in their earliest stage, and we no longer meet with neglected serious cases forming an inextinguishable source of fresh infections. Finally, I would remark, that I have purposely omitted statistical accounts and descriptions of individual cases, because the medical men who furnished us with patients for our investigations have themselves decided to publish the description of their cases, and I wished my account to be as objective as possible, leaving to them all that is purely personal.

KOCH'S DISCOVERY.

THE cablegram which forms this extra edition is one which contains, in all probability, the seed of a discovery the extent of whose fruit cannot be grasped by the human mind, and which bids fair to surpass the triumph of Jenner in his warfare against smallpox. Unlike variola, which occurs in epidemics, the great white plague, consumption, has year after year, with far more fearful results, swept off millions of human beings, until every hamlet and village has learned to speak of it with bated breath.

It is not for us, knowing so little of the true nature of Koch's studies, to decide at this time as to the future of his methods. Not improbably many of the profession may be conservative enough to declare their utter lack of faith in all such work. On the other hand, there is the ever-present need in medicine of sufficient thoughtfulness to avoid following every new idea with feverish haste, and while we can regard the man and his work with pride, it behooves us to reserve our opinions until time discloses the more minute workings of his methods.

It also seems appropriate that the leading medical weeklies of each of the great Anglo-Saxon races, THE MEDICAL NEWS and *British Medical Journal*, should be the first to present this subject in an authoritative manner to their countrymen on the same day that the author publishes his original copy in the *Deutsche medicinische Wochenschrift*.

Removal of the Gall-bladder.—TERRIER (*Bull. de l'Académie de Médecine*) records his second cholecystectomy, both operations being successful. The operation has been performed only five times in France. Dr. Terrier's last patient was a woman aged fifty-years who had suffered from exceedingly severe attacks of hepatic colic for twenty-six years. The liver was enlarged, but the gall bladder could not be felt, and there was no jaundice until just before the operation, when the usual signs of biliary obstruction appeared. As these symptoms were not relieved by the usual remedies and as death seemed probable the abdomen was opened. The incision was made in the right linea semilunaris and the distended gall-bladder easily found. It was adherent to the omentum but was easily detached. About one pint of viscid, almost colorless, fluid was drawn off. A number of calculi were then removed with difficulty, after which the neck of the gall-bladder was ligated and the body and fundus removed. The abdomen was closed in the usual manner, a medium-size drainage-tube being inserted. After the operation a large quantity of bile escaped through the tube and there was much vomiting but the patient made a complete recovery.

M. Terrier thinks that in cases in which the gall-bladder is very large the median incision would be preferable. The separation of the gall-bladder from the liver may be followed by free oozing which can be checked by pressure with a sponge or by the thermocautery. Large vessels can be lightly tied.—*British Medical Journal*, October 18, 1870.

Psorospermiosis.—DR. BOECK (*Monatshefte f. praktische Dermatologie*, September, 1890) presented the following case of psorospermiosis to the Society of Physicians of Christiania. The patient, a man aged forty-seven years, had suffered from the disease for sixteen years. Scattered over nearly the entire surface of the body was an eruption of papules, varying in size from a millet- to a hemp-seed, which were covered with epidermic scales. The case was a typical example of Darier's *psorospermose folliculaire végétante*.

Microscopical preparations were shown in which there were numerous encysted coccidia in the epithelium, especially in the stratum granulosum. Where the process was severe the epidermis became detached from the papillary body in such a measure that only single rows of cells covered the latter. Dr. Boeck also presented to the Society at a subsequent meeting two more cases of the disease, both the patients being sons of the patient mentioned above, evidence in favor of the contagiousness of the disease. The eruption in the

sons occupied the same sites as in the father. Dr. Boeck said that the disease, when not of too long duration, was amenable to treatment, and that therefore treatment should be commenced early. In one of the recent cases pyrogallic acid ointment was applied with success; in the other case no treatment had been adopted.—*British Medical Journal*, October 18, 1890.

Sunflower in Malarial Fevers.—DR. V. N. ZUBOVITCH (*Vratch*) has administered sunflower to a number of cases of malarial fever. He used the remedy in the form of a tincture of either the fresh flowers or the fresh bark of young stems. To an adult a liqueur-glassful was given three times daily, the administration being continued for two or three days after the complete cessation of the paroxysms. With others, Dr. Zubovitch finds (1) that the sunflower treatment is invariably followed by a complete and permanent cure in from three to ten days, even in inveterate cases in which quinine has utterly failed; (2) that all types of malarial poisoning are equally amenable to this treatment; (3) that during the administration of the sunflower no unpleasant symptoms of the drug are manifested other than occasional profuse night-sweats; (4) that the tincture of the flowers seems to act more quickly than that of the bark.—*St. Louis Medical and Surgical Journal*, November, 1890.

Treatment of Epithelioma of the Face with Acetic Acid.—At a recent meeting of the French Society for Dermatology and Syphilography ARNOZAU reported eight cases of epithelioma of the face commencing in the sebaceous glands, that were treated by local applications of acetic acid. The applications were made with a piece of wood, a glass rod, or, if the disease was extensive, with a brush. In some cases the acid was used every second day; in others, every day; and in still others, several times daily. During the first sittings crystallized acetic acid diluted one-half or two-thirds with water was used; later the pure acid was applied. The treatment causes sharp burning, which, however, is of short duration. The eschar produced by the acid at first adheres closely, then begins to loosen at the edges, and the applications should be continued until the crusts drop off and leave a healthy, granulating surface. The granulations then begin to cicatrize, and finally leave a small scar. The patient can carry out the treatment himself.—*Occidental Medical Times*, November, 1890.

The Removal of Freckles.—The *Pharmaceutical Record* quotes the following prescriptions for removing freckles:

R.—White precipitate } of each 1 drachm.
Bismuth subnitrate }
Glycerite of starch . . . 4 ounces.—M.

Apply every second day.

Or,

R.—Sulphocarbolate of zinc . . 1 drachm.
Glycerin 2 ounces.
Alcohol 1 ounce.
Orange-flower water . . . 1½ "
Rose water, sufficient to make 8 ounces.—M.

Apply twice daily.

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